JULY 1987
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A+

The #1 Apple II Mag

MAKING MUSIC WITH THE IIGS

DISCOVERING SCIENCE

EXPERIMENT WITH YOUR APPLE II

LEISUREWARE
A Couch Potato's Guide to Summer Fun

IIGS PROGRAMMING
More Secrets of the IIGS Sales Demo Revealed

APPLEWORKS REPORT
Multicolumn Formatting for Newsletters
FactWorks: Facts on Disk

TEACHERS' TOOLBOX
Problem-Solving Skills

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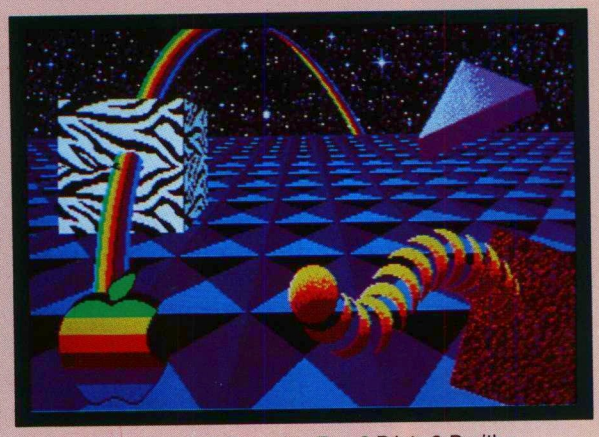
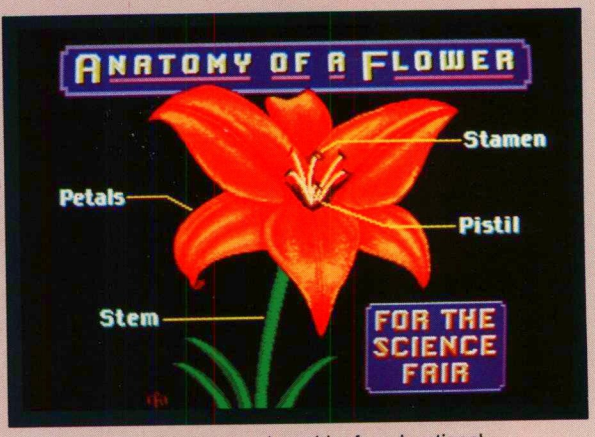
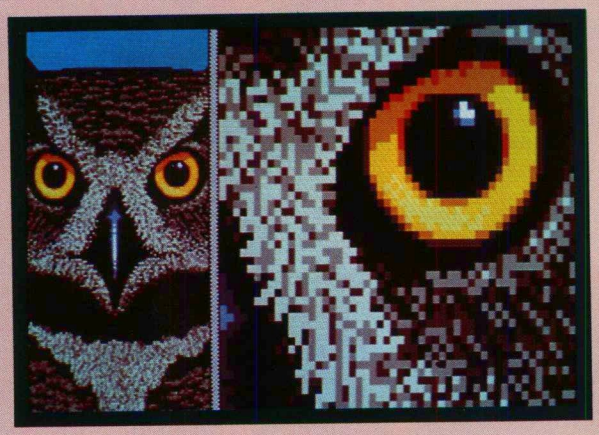
IT PROGRAM THAT CAN DO ALL THIS!



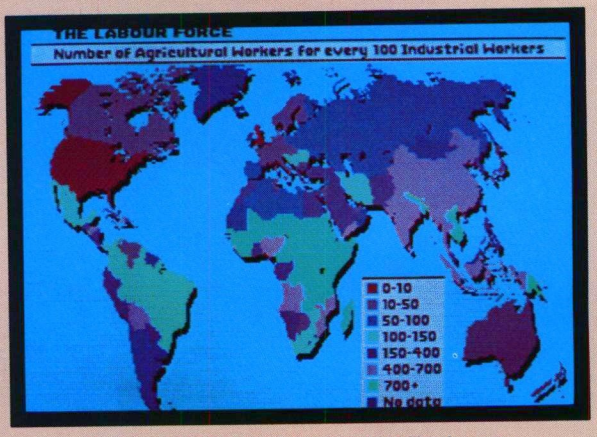
Enter the third dimension. Turn 2-D into 3-D with a click and get a new perspective!



Combine text and graphics for educational presentations. It's easy enough for kids of all ages.



Zoom in through four levels of magnification and put the gleam in the owl's eye.



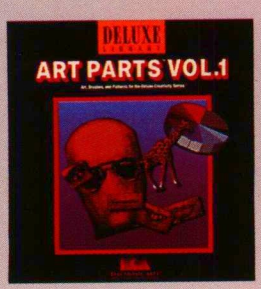
Create colorful presentation graphics like the pros. It's a whole new world for business presentations.

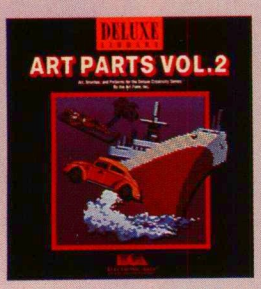
$50 Offer! Upgrade any Apple IIGS paint program to DeluxePaint II

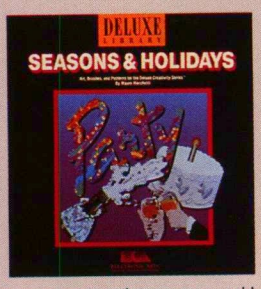
If you jumped the gun and bought Paintworks Plus™—or any other Apple IIGS paint program—here's your chance to get the best for HALF PRICE! Just send us $49.95 and the front manual cover from your current program before July 31, 1987, and we'll send you DeluxePaint II. (You save $50!) We'll even give you a 30-day, no-questions-asked, 100% money-back guarantee on this upgrade offer if you're not completely satisfied. How's that for backing our claim?

DeluxePaint II requires 768K of RAM. The upgrade offer is only available directly from Electronic Arts. Send check or money order for $49.95 (or VISA/Mastercard information) AND THE FRONT COVER OF ANY APPLE IIGS PAINT PROGRAM MANUAL (no facsimiles accepted) to ELECTRONIC ARTS, DELUXEPAINT IIGS UPGRADE, 1820 Gateway Drive, San Mateo, CA 94404. Allow 4-6 weeks for delivery.

TO ORDER DELUXEPAINT II: Visit your retailer. If you can't find DeluxePaint II there, call 800-245-4525 (in CA 800-562-1112), and place a direct order on your VISA or Mastercard. To order by mail, send check, money order, or VISA/Mastercard information to Electronic Arts Direct Sales, P.O. Box 7530, San Mateo, CA 94403. The regular direct-order price is $99.95; add $3 for shipping and handling ($5 Canadian). There is a 30-day money-back guarantee on direct orders. Allow 6-8 weeks for delivery. Apple IIGS is a trademark of Apple Computer, Inc. Paintworks Plus is a trademark of Activision, Inc. DeluxePaint II is a trademark of Electronic Arts.







Look for the Deluxe Library of color clip-art disks, with over 350 images you can use to enhance your work!

ELECTRONIC ARTS®

DELUXE CREATIVITY SERIES™

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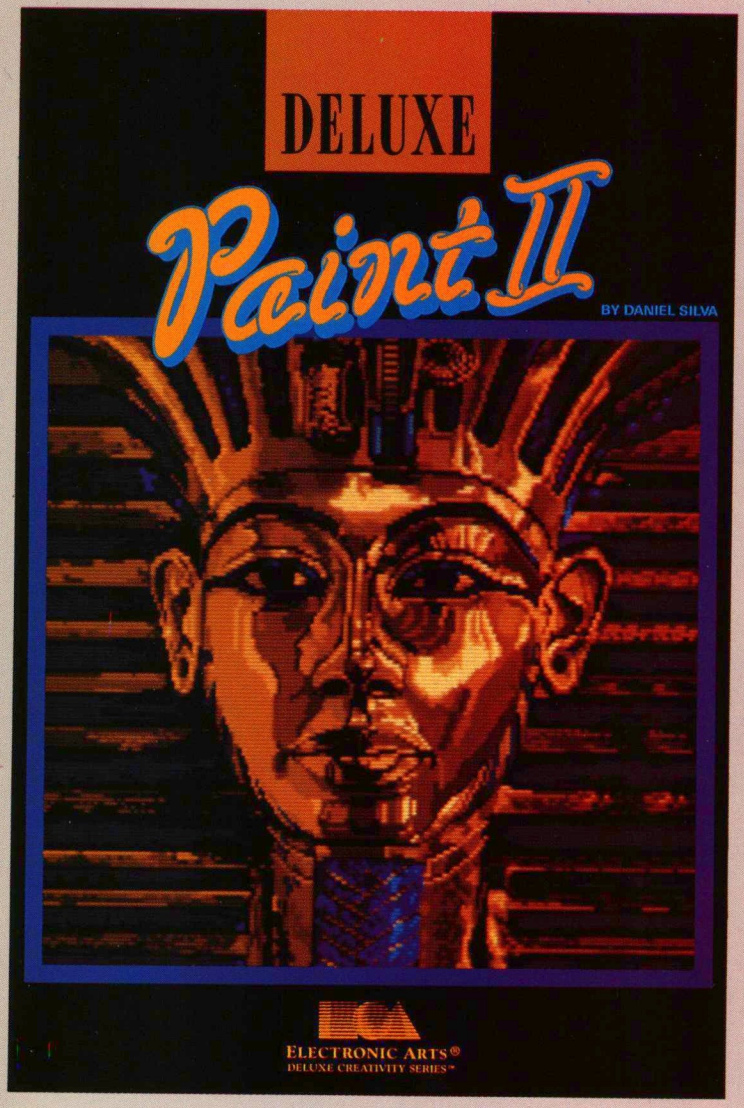
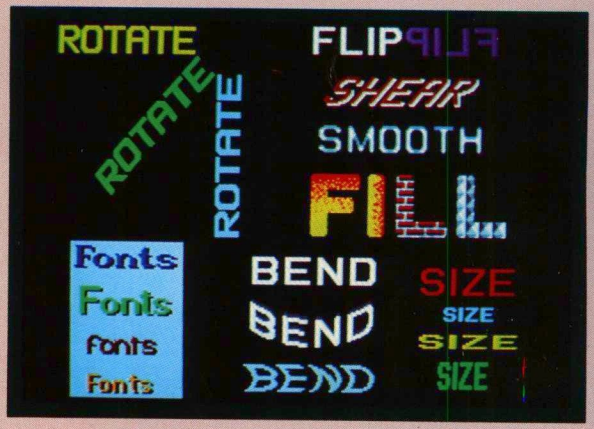


...THE ONLY PAI

Fill any area with a custom pattern or gradient color blend. Create tile or textile designs in seconds!



Alter fonts a dozen ways: flip, shear, blend, rotate, fill or resize any text. Design your own logos!

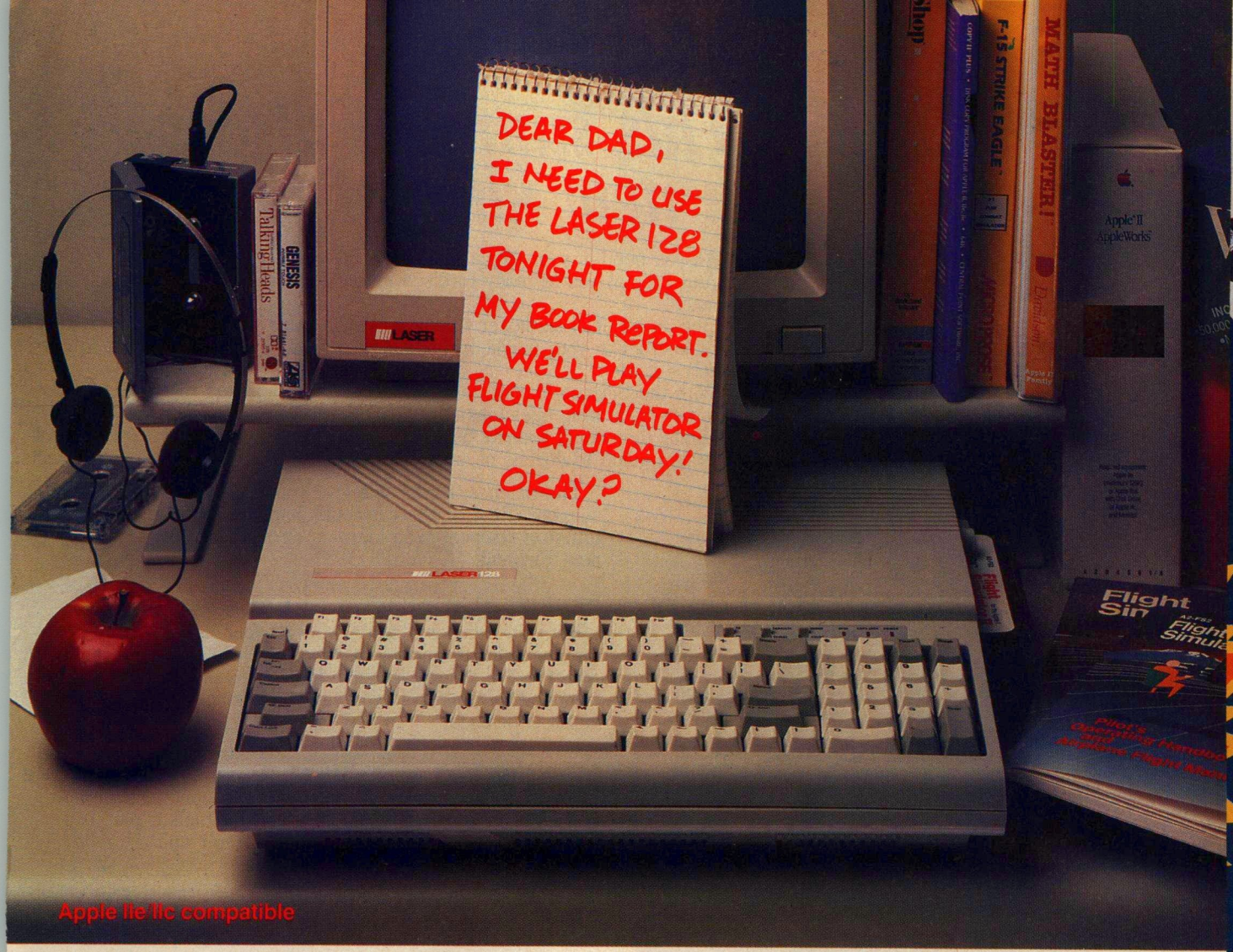
INTRODUCING DELUXEPAINT II. The images above were all produced with the most advanced paint program ever created for a personal computer. The only paint program that lets you zoom in to see your painting in four levels of detail, create custom gradient color ranges from a 4,096-color palette, freeze an image and paint over it, and do dozens of other things you never knew a personal computer could do. The program is DeluxePaint II. The result is more than just a pretty face.

GREAT GRAPHICS...the best reason to buy an Apple IIGS. And the best reason to buy DeluxePaint II. With DeluxePaint II you can master the third dimension with the exclusive 3-D perspective tool. Soften jagged edges and color transitions with the smoothing tool. And give life to static pictures by cycling through a range of colors. Computer graphics have never been so easy. Or so powerful.

"THE BEST GRAPHICS PRODUCT OF THE YEAR." We didn't say it. The Software Publishers' Association did—and gave us the award to prove it.

DELUXEPAINT II. MORE THAN JUST A PRETTY FACE.

INTRODUCING DELUXEPAINT™ II
FOR THE APPLE II GS...



Now your kids can afford to do their homework

More and more students are learning with computers. However most parents haven't been able to work a computer into their budget. The Laser 128 Apple-compatible computer will let you do all those things that you and your family want to or have to do — homework, write reports, even play games for a fraction of the cost of an Apple. With a Laser you can work out your budget on a computer, instead of breaking it with one. The Laser lets you take advantage of the largest software library available, so your child can learn more at home with the same programs they learn on in school. And, you can do your work at home on the Laser, too.

The Laser 128 with all its built-in features makes for a pretty educated buy: disk drive; 128K RAM; serial, parallel, modem and mouse interfaces; 80 column text mode; numeric keypad; and expansion slot.

For the name of the dealer nearest you, call Central Point Software at 503/244-5782, 8-5, M-F. Or order direct (VISA, MC, check) adding $20 s/h. 9700 SW Capitol Hwy, Suite 100, Portland, OR 97219.

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LASER 128 A+

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This summer, discover a new kind of fun.

All you need is your Apple II and the Science Toolkit™.

And Presto! You're ready to discover the excitement — and the fun — of science.

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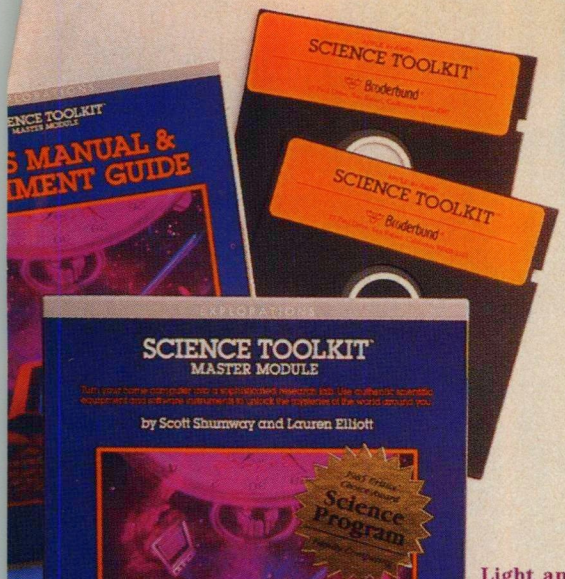
With the Science Toolkit, you can discover the answers to these and lots of other fascinating questions. You'll get scientific instruments that are so accurate they could actually be used in a real research laboratory. Plus an illustrated guide to dozens of experiments that use common household objects.



User's Manual and Experiment Guide gives you step-by-step instructions for dozens of experiments!

Light and temperature probes are highly sensitive scientific instruments.

The Science Toolkit will give you hours of pleasure this summer. Best of all — it could start you on a lifelong interest in science. Who knows, you may be the world's next Einstein.

Start mastering science with Master Module™.

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Module 1: Speed and Motion adds a second light probe and a balloon-powered speedster to your toolkit, plus two more software instruments: a speedometer and tachometer. (Requires Master Module.)

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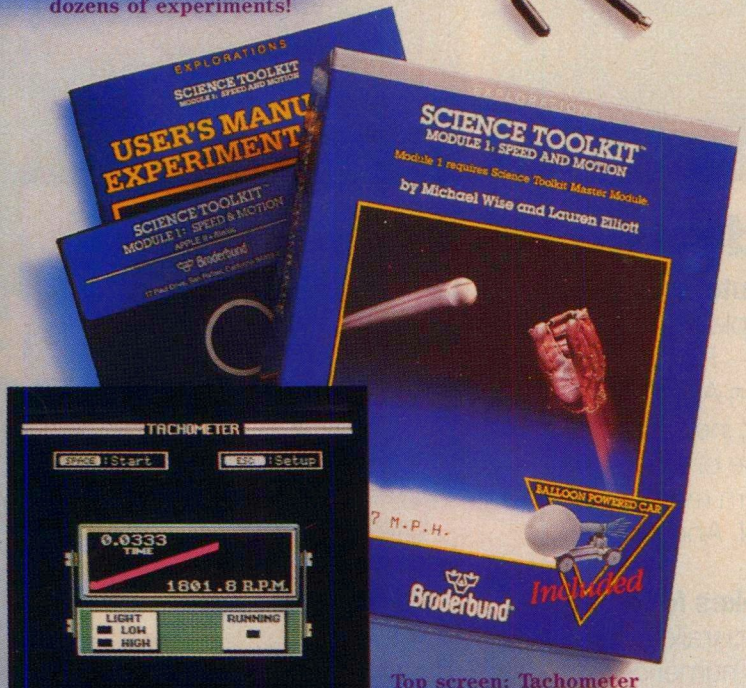
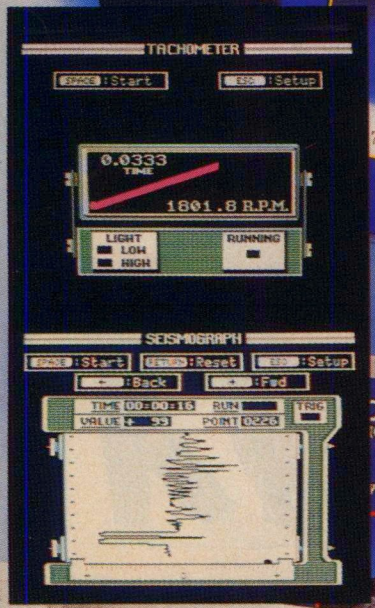
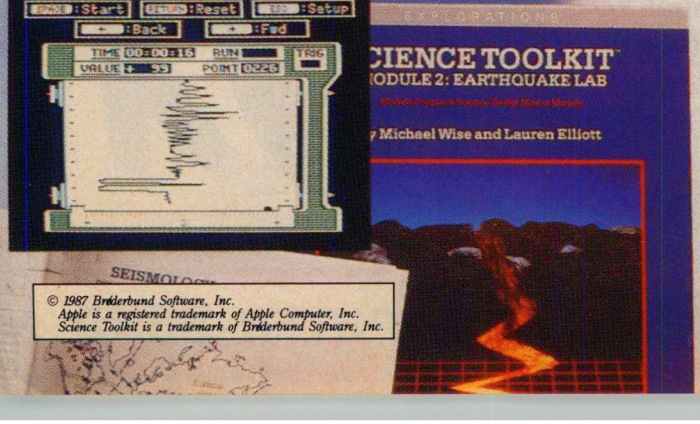
In 1687, Isaac Newton used an apple to discover gravity. This summer, you can use your Apple to discover fun.

The Science Toolkit is recommended for ages 9 and up, and is available for Apple II+, IIe, IIc, IIGS (II+ requires joystick adapter).





Top screen: Tachometer
Bottom screen: Seismograph



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In fact, the features that make Type! the most advanced touch typing software on the market are simply not available on any other program.

Like real words and sentences. Commonly used random letter drills are not only dull but ineffective.

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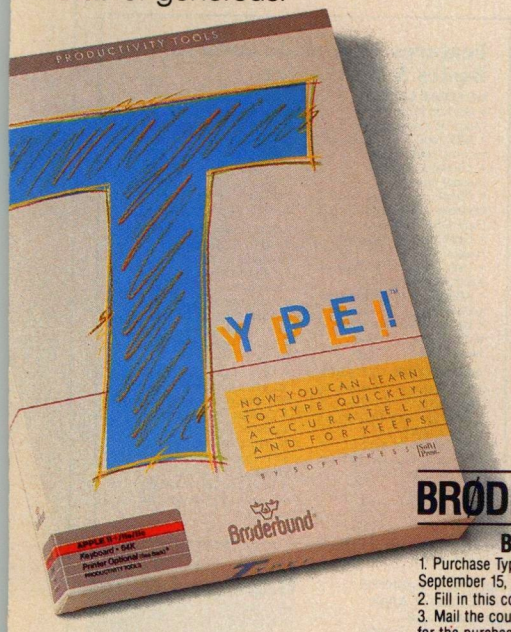

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- If you need to brush up on your accounting, use our accounting primer and tutorial, written by Harvard Business School Professor, Robert N. Anthony, plus our business section on how to handle everyday accounting dilemmas.

$199

Back to Basics Accounting System is not only a best seller but an incredible value with all three modules — General Ledger, Accounts Receivable and Accounts Payable — in a complete set for just $199.

In its special report on the best small business accounting software, *PC World* said, "Back to Basics takes the *smallest bite out of your capital,* yet it's also the easiest to use of the three contenders. For a bargain price, Back to Basics provides a lot of punch, especially for businesses with heavy cash handling requirements."

Proven Power

Peachtree has long been the first name in accounting software and the powerful features we've included in Back to Basics prove we understand what you're looking for.

- Complete integration of General Ledger with Accounts Receivable and Accounts Payable.
- Single transaction entries up to $999,999.99 and year-to-date totals up to $21,000,000.
- Journals and reports updated as each transaction is recorded.
- Void transaction facility automatically creates reversing entry.
- *More than 30 reports* can be viewed on screen or printed.

Ongoing Accolades

Back to Basics Accounting System is designed to take full advantage of the capabilities of your Apple II computer, with customized versions for the Apple II+, IIe, IIc, IIgs and Macintosh.

Peachtree's support, labeled by *InfoWorld* as "the finest in the industry", is available as you need it, at a nominal charge directly from Peachtree or through our network of local authorized support centers.

Money Back Guarantee

When you purchase Back to Basics directly from Peachtree Software you're protected with a 30-day, money back guarantee (an option even the most expensive accounting products don't offer).

If you're not satisfied, simply return the complete product in saleable condition within 30 days and your purchase price will be promptly refunded. For full details, call the toll free telephone number below.

Now Available for the Apple IIgs

A new version of Back to Basics Accounting is now available for the Apple IIgs, designed specifically for use with the PRO-DOS operating system and 3½" disk drives or a hard disk.

Hardware Specifications

- IBM Personal Computer, PC/XT, PC/AT with two floppy disk drives or one floppy disk drive and a hard disk.
- Apple II+, IIe, IIc, IIgs with 128K and two disk drives or hard disk.
- Apple Macintosh 512K or Plus with two disk drives or hard disk.

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- On-line help displays Chart of Accounts.
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- Optional cost of sales ranges.
- User modifiable Chart of Accounts included.
- Allows up to 3 checking accounts.
- Up to 10 departments with separate income statements.

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- Calculates receivables on balance forward basis.
- Prints statements and mailing labels.
- Allows automatic posting to General Ledger.
- Accepts partial payments.
- Calculates finance charges.
- Up-to-date customer information can be scrolled for review at any time.
- Customer ID's can be alpha or numeric.
- Verifies customer credit limit.
- Calculates up to 3 sales taxes per entry.

ACCOUNTS PAYABLE
- Up to 10 vendor payment terms.
- Calculates cash discounts.
- Accepts partial payments.
- Automatic posting to General Ledger.
- Prints vendor mailing labels.
- Up-to-date vendor information can be scrolled for review at any time.
- Customer ID's can be alpha or numeric.
- Prints computer checks or processes hand-written checks.
- Invoices automatically or manually selected for payment.

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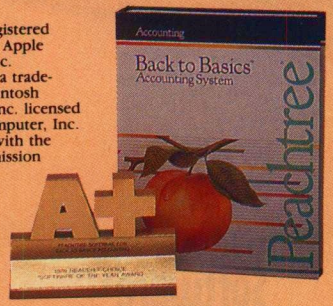

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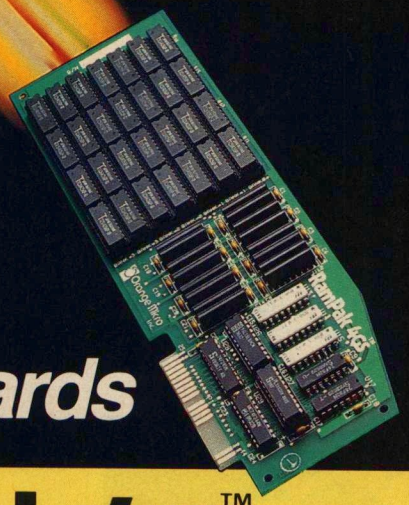

RamPak™ 4GS

Memory Sub-System

Memory Cards can be Dramatically Different

In recent benchmarks, the new RamPak 4GS Memory Subsystem significantly outperformed the Apple memory card and the Applied Engineering GS-RAM card. In tests using Appleworks software, RamPak 4GS increased the Apple IIGS throughput up to 350% compared to ordinary memory cards. Your Apple IIGS runs faster with the RamPak because the exclusive RamPak Memory Management Software reduces the computer's dependence on the disk drive.

Memory Management Software is the RamPak's Secret

Your RamPak comes with our powerful Memory Management Software. The unique Disk Caching feature stores the most-often-used data in main memory, eliminating the time you spend waiting for slow disk accesses.

Our dynamic Cache Allocation feature manages the system memory automatically so your Apple IIGS will always be at peak efficiency. And, it runs great with the standard Apple Ram Disk Utility!

Smart Memory up to 4 Megabytes

The RamPak 4GS comes standard with 512K and can be easily expanded up to 4 megabytes by adding state-of-the-art one-megabit RAM chips. This is four times the RAM size of the standard Apple memory card, all on one board!

Available now at your local Apple Dealer

The RamPak 4GS is an important part of any Apple IIGS system. Ask your dealer for the RamPak 4GS and watch your system run up to 350% faster.

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CIRCLE 108 ON READER SERVICE CARD

A+ CON

VOTED **BEST COMPUTER MAGAZINE** BY THE COMPUTER PRESS ASSOCIATION

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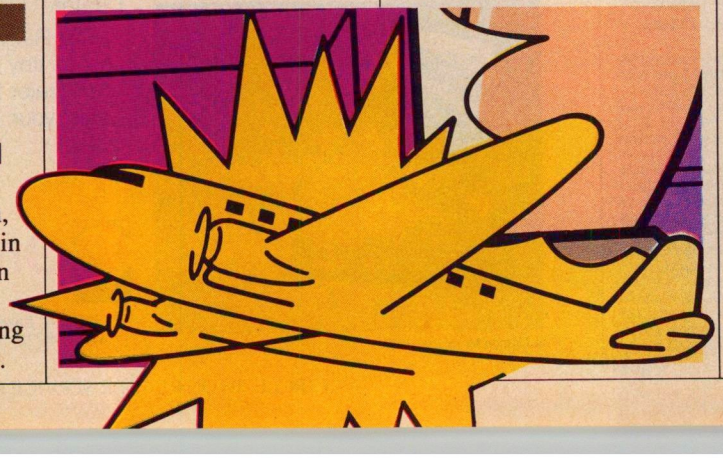

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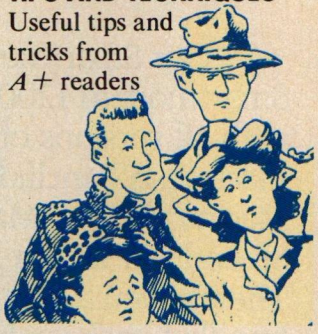

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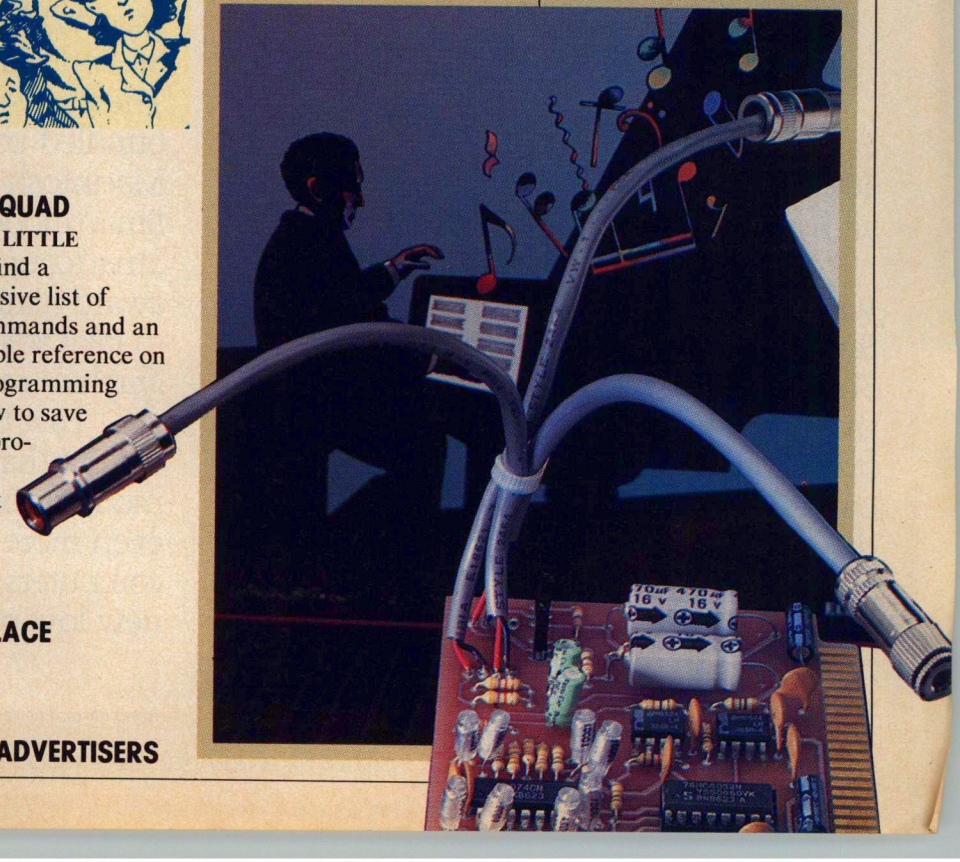
Programmers Lichty and Crosley wrote the IIGS sound-and-graphics sales demonstration for Apple Computer. In this second of two articles, they share some of their programming techniques and several annotated examples of the demo's assembly code.



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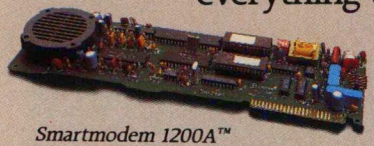

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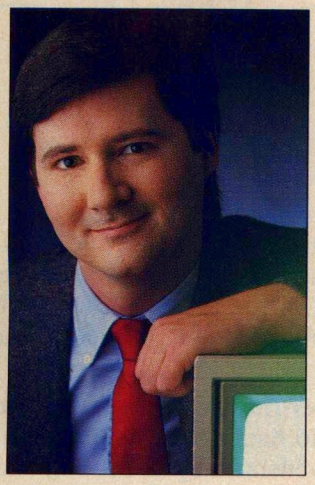

If scientists and inventors were not able to learn from and build on the work of their predecessors, progress would slow to a snail's pace.

THE GREAT LOOK-AND-FEEL DEBATE

One of the hottest topics in the computer industry today is the great "look and feel" debate. *Look and feel* refers to the user interface of a software program, and the debate about it centers on who, if anyone, owns the rights to the way a user interface looks and feels. If anyone does own the rights, the discussion continues, how far can they go in pursuing legal action against people who either copy the user interface or become inspired by it and improve it?

The debate has been going on in certain circles for quite a while, but it really didn't start getting major attention until Apple filed suit against Digital Research two years ago, claiming that the GEM operating system violated Apple's copyright of the Macintosh user interface. The Apple vs. Digital Research case was settled out of court, however, when Digital Research agreed to modify GEM to appease Apple, so no legal precedent was set by that case.

Look and Feel, Round 2

The precedent-setting legal case in the look-and-feel debate did not occur until recently. You may recall that in *A+*'s January and April issues, we reported in the "NewsPlus" section about the Brøderbund vs. Unison World copyright-infringement case. In this case, a judge had determined that Unison World's Print Master program violated Brøderbund's copyright on the user interface of Brøderbund's blockbuster program The Print Shop. The judge pointed out two key areas of the case that led him to his decision: First, Unison World had gained access to the actual source code of the Apple version of The Print Shop while it was under contract with Brøderbund to produce an IBM PC version of The Print Shop (the contract later fell through). Second, the judge cited what he called "gratuitous copying of the user interface." There were instances in Unison World's Print Master program for the IBM PC in which menu selections were so much like those in the Apple version of The Print Shop that they didn't make sense on the IBM PC; things that could have (and even should have) been different on the menus were not, and the judge thought that this evidence indicated a direct rip-off rather than an inspiration. The case is now under appeal.

Lotus Enters the Fray

This past spring, things heated up further when Lotus announced a $50 million suit against Paperback Software's Lotus 1-2-3 derivative, called VP Planner. Paperback Software is Adam Osborne's latest venture. This case, however, is not as cut and dried as the Brøderbund vs. Unison World case. For one thing, Paperback Software didn't have access to the source code of 1-2-3. Also, VP Planner offers certain enhancements to 1-2-3, such as the ability to build a three-dimensional spreadsheet.

Recently, another strange twist has added fuel to the debate. While Lotus was busy suing Paperback Software, Software Arts Publishing Company, which developed VisiCalc, filed a $100 million suit agains Lotus, saying that 1-2-3 violated the look and feel of VisiCalc. Touché! And now people at Xerox are mumbling that the Lisa and Macintosh were copies of the Xerox Altos and Star user interfaces. Where will it all end?

Going Too Far

As far as I'm concerned, things are getting out of hand. Although I think protecting copyrighted materials is

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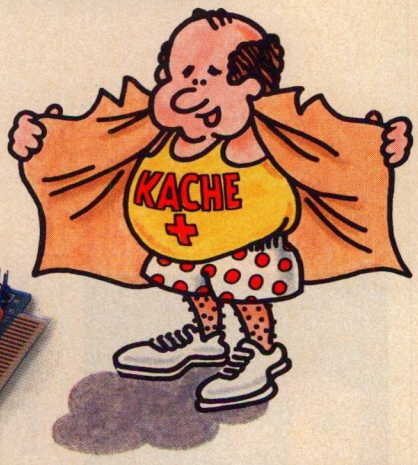
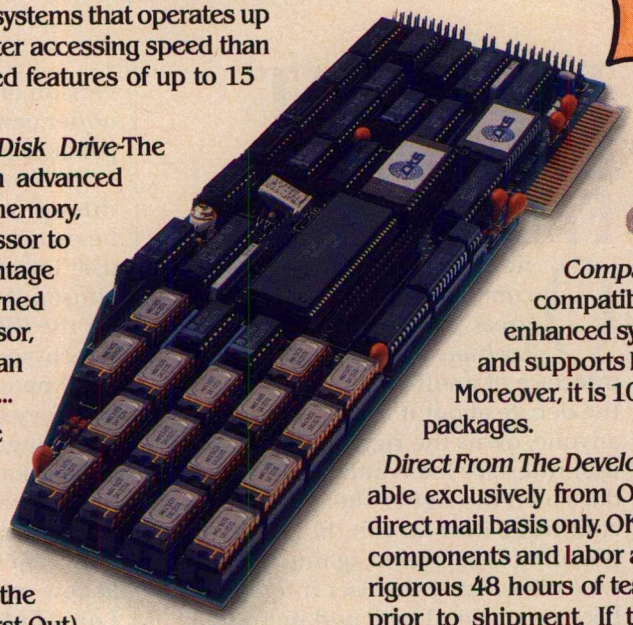


*The Kache Plus Card...Shocking Speed **PLUS** Expanded Performance*-The Kache Plus Card is a powerful floppy disk adapter board for Apple *II* systems that operates up to six floppy drives. It offers faster accessing speed than hard disk drive ***PLUS*** the added features of up to 15 popular expansion boards.



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Compatibility - The Kache Plus Card is compatible with Apple *II*, *II+*, *IIe* and *IIe* enhanced systems with 1-6 floppy disk drives, and supports DOS, PASCAL, ProDOS and CP/M. Moreover, it is 100% compatible with all software packages.

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essential, the general look and feel of a product is not really something that should be copyrighted. Few people realize that information can't be copyrighted; only the exact manner in which the information is expressed is subject to protection under the copyright law.

You only need to look at some other industries to see how liberal the interpretation of the copyright law is when it comes to look and feel. Let's take dictionaries, for example: Virtually every dictionary I own is copyrighted, yet every one of them has an almost identical look and feel. Words are always boldfaced, in alphabetical order; each word is followed by a pronunciation and then a statement about what part of speech the word is; and finally the definitions are presented in a numbered sequence. Only the definitions themselves need to be different to avoid a copyright violation.

Some products not only happen to have the same look and feel, but it's a good thing they do. If cars didn't have an operating system that had the same look and feel from car to car, for example, the highways would be incredibly hazardous.

Stifling Progress

Many great achievements, ideas, and products are based on what came before them. If scientists and inventors were not able to learn from and build on the work of their predecessors, progress would slow to a snail's pace. Although safeguarding certain intellectual property is important, becoming overzealous about protecting ideas can have an adverse effect by preventing important concepts from being used as building blocks for the tools of the future. Building on and improving on good ideas produces better ideas. That's how the Apple II, IBM PC, and Macintosh (and every other microcomputer) were built, and it's what this industry is all about. Let's keep it that way. +

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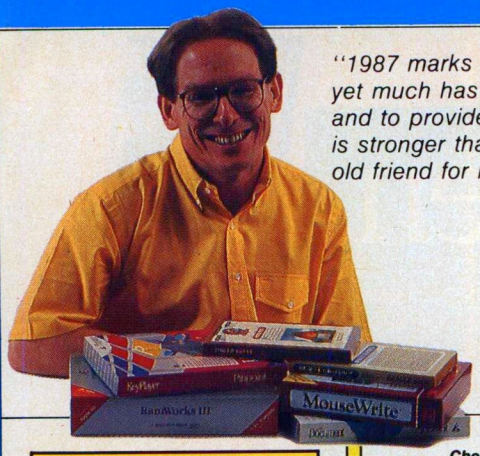

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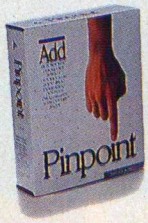

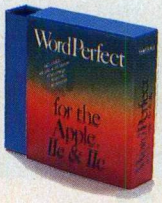

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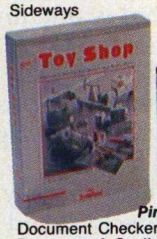

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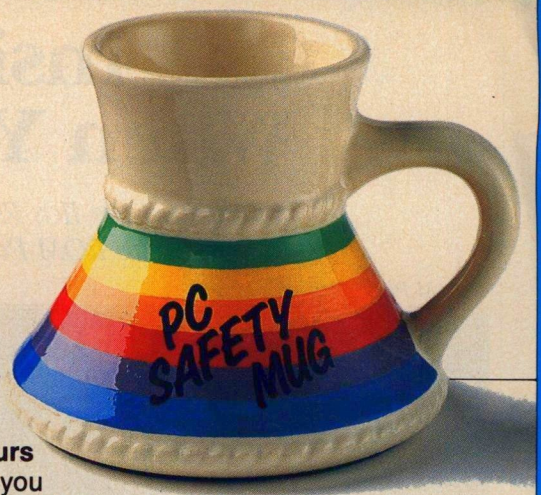

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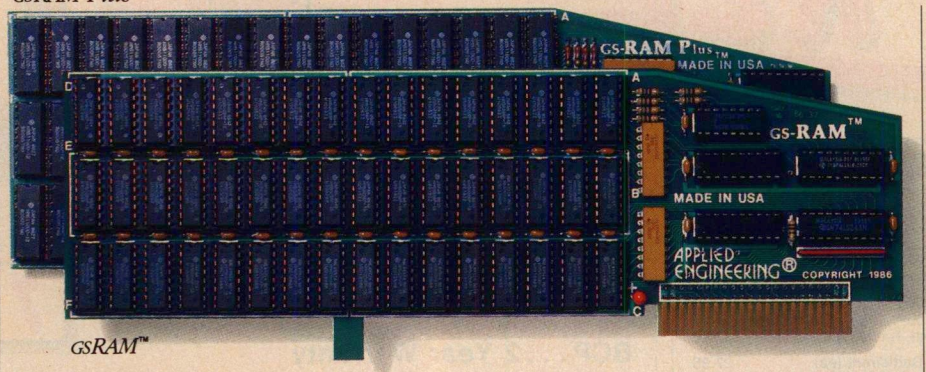

GSRAM™

Remember the 16K cards for the II+ and the 64K cards for the IIe? At the time, that much memory seemed like a lot. But when the owners of these memory cards came to us for more memory, many had to throw away their smaller Apple memory cards or try to sell them. Most of our customers told us that had they known about Applied Engineering's larger memory cards when they bought their Apple, they would have purchased them at the same time.

GSRAM and GSRAM Plus are available now, allowing up to 8 MEG of memory expansion. That's 8 times the memory capacity of Apple's card and just look at the benefits that only GSRAM and GSRAM Plus have over Apple's card:

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- Expands AppleWorks internal limits
- Built-in Hi-Res self-diagnostic software
- 5 year hassle free warranty (Apple has a 90 day warranty)
- Made in USA

GSRAM for More AppleWorks Power

Only GSRAM and GSRAM Plus eliminate AppleWorks internal memory limits, increasing the maximum number of records available from 6,000 to over 25,000 and only GS-RAM and GSRAM Plus increase the number of lines permitted in the word processing mode from 6,000 to over 15,000. And only GSRAM and GSRAM Plus offer a built-in printer buffer so you can continue using Appleworks while your printer is printing. GS-RAM and GSRAM Plus even expand the number of lines in the clipboard from 255 to 2047 and will auto segment large files so they can be saved on two or more disks. You can even have Pinpoint or Macroworks and your favorite spelling checker in RAM for instant response. GSRAM and GSRAM Plus will even display the time and date right on the AppleWorks screen. Nothing comes close to enhancing AppleWorks so much.

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Simply plug GSRAM into the IIGS memory expansion slot and you've got up to *8 megabytes* of RAM at your fingertips—all of it instantly and automatically recognized by the IIGS. GSRAM is compatible with all IIGS software, including AppleWorks, as well as BASIC®, ProDos, DOS 3.3, PASCAL®, "C" and CP/M®.

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GSRAM is available with 256K, 512K, 1 MEG or 1.5 MEG of memory already on board. If you don't need the full 1.5 MEG now, you can choose a GSRAM with less memory and expand it up to 1.5 MEG in the future—or upgrade to GSRAM Plus for a small charge.

"In quality, performance, compatibility, expandability and support, Applied Engineering's GSRAM and GSRAM Plus are number one."

Steve Wozniak, the creator of Apple Computer

With an optional piggyback card, you can expand GSRAM even higher than 1.5 MEG! (Other cards are only expandable to 1 MEG.)

GSRAM Plus—for Growing by Leaps and Bounds

GSRAM Plus is the first Apple memory card to use 1 MEG RAM chips on the main board. It's available with 1 to 6 MEG on board. If you don't need the whole 6 MEG now, you can buy a GSRAM Plus with less memory and easily expand it in the future.

GSRAM Plus can be expanded up to 8 MEG with an optional piggyback card.

Easy Expansion

Both GSRAM and GSRAM Plus use standard RAM chips that are readily available and just plug right in. So unlike other cards, you'll find expanding your GSRAM or GSRAM Plus easy, convenient and very economical. And with our optional ROM expansion module you can even increase the IIGS's ROM space and all in just one slot.

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We invite your comments.

Letters

VIP POINT

Dear A+: My experience with VIP Professional leads me to conclude that it could well be some of the most important programming ever accomplished for the Apple II because it demonstrates that it is possible to write useful programs containing large amounts of complex code for the 6502. Unfortunately, the review of this program in your May issue would lead one to believe that VIP Professional is anything but useful. If the review were justified, I would not take issue with it. My own experience with VIP Professional, however, in no way parallels that of your reviewer.

I feel certain that most Apple II owners considering purchasing VIP Professional already own auxiliary-slot memory boards such as RamWorks. In fact, it is difficult to utilize fully much of the new-generation software without one. I do not believe it is fair to add the cost of the added memory to get a "true cost" for VIP Professional.

I have found that VIP Professional on the IIe is indeed slower than Lotus 1-2-3 on my IBM PC-AT in calculating a 360-payment amortization schedule such as the one described in your review but not nearly so slow as you suggest. Your review, in fact, indicates that the program will not work at all with such a spreadsheet. My results, using my own spreadsheet, are significantly better.

My spreadsheet consists of six columns headed Payment #, Principal, Cumulative Principal, Interest, Cumulative Interest, and Balance. The @PMT function is used to calculate the payment at the top of the spreadsheet. The key to using this spreadsheet is to change the calculation order to "row," since calculation by column would make no sense. One calculation cycle is required to compute all 360 rows. The identical layout was used on the AT and on the IIe. The results? The AT (which has a math coprocessor installed) recomputed the sheet in 4 seconds; the IIe took 58 seconds at normal 6502 speed. (There is, incidentally, some sort of incompatibility between the Transwarp and the program, which prevents the use of the @PMT function at Warp speed. The helpful folks at ISD Marketing Technical Support are now working on this problem, but for now to use the @PMT function you are stuck at 1 MHz.) I think that most Apple users will not consider 58 seconds to be unreasonably slow for a spreadsheet of this size.

I would also like to address reader Hoegerl's comments in the "Letters" section of the same issue. Remember that VIP Professional is designed to work like 1-2-3. In this case, it works just like 1-2-3. That's right—1-2-3 has the exact same problem. I recommend that exact (e.g., if a=b) comparisons be avoided as a matter of principle in favor of less exacting (e.g., if a<=b) comparisons. Doing so avoids potential pitfalls caused by the sometimes peculiar way in which the computer represents numbers. Another possible fix (depending on the application) is to use

@INT(((10.7−10)*10)+.0000001).

This should work if the expected value of the calculation is an integer.

VIP Pro has its faults (so does 1-2-3), but it appears to me to be fundamentally sound and a useful addition to the software library of most serious Apple users.

Gordon M. Nichols
North Augusta, SC

Although our review of VIP Pro in the May issue was by no means a rave, our reviewer said some good things about the program, such as "... it does some nifty things that make it difficult not to like. Its ability to work with Lotus 1-2-3 files downloaded from CompuServe or some other information service is almost uncanny ..." and "For new users who haven't spent much time with either the IIe or a spreadsheet program, VIP Pro might be just dandy..."

One of the primary purposes of reviews in A+, however, is to see how a product lives up to its own claims, and that is where we really had some problems with VIP Pro. Even though we might lose some ads, our primary loyalty is to the readers, which means we question advertisers' claims about products. In the case of VIP Pro, the claims were bold. Here are some examples culled from ads for VIP Pro that have appeared in A+ and in marketing information from the company that produces the program:

"... Professional matches the power of any spreadsheet for any computer!"

"The finest program ever for the Apple II..."

"Better than 1-2-3... Better than AppleWorks... Better than Excel..."

"... its massive database and text processing capabilities outshine even AppleWorks."

"... the most powerful business tool ever available to Apple users."

When a company makes claims that bold, we feel compelled to judge the program by those claims. And although VIP Pro is an interesting and potentially useful program, it does have certain problems, and it simply doesn't live up to its claims. If VIP Pro's ads have been a bit tamer, our review might have been tamer as well.—Editors

VIP COUNTERPOINT

Dear A+: I loved the review of VIP Pro by Amanda Hixson in the May issue. I have beefed up an Ap-

ple IIc and a IIe with Applied Engineering boards (nearly all the ones mentioned in the review), and I still get that awful ***Fatal System Error—Please Reboot***. On my Apple IIe, death occurs without warning nearly every time I try to print; and on my IIc, death occurs as soon as the program is finished loading. I might as well pull the power plug.

I spent several hundred dollars, hoping to achieve IBM-like performance from my favorite computer. Just as Ms. Hixson suggests, the results were less than advertised. There is a side benefit from all this which was not emphasized in the review, however. AppleWorks performance becomes incredibly fast and simple! Fast execution and no waiting for disk drives—I'm in love again!

R. Alan Christie
American Falls, ID

COMB IIc ACQUISITION

Dear *A+*: This letter is in regard to your recent column about the COMB Company and its acquisition of IIc computers ("NewsPlus," March 1987). As a former employee, I feel I might be able to shed some light on this matter.

As a sales representative, I was told the machines came directly from Apple, but there was no indication of that being true. It was considered a hush-hush matter. We were also told that the equipment was new. I disagree with that. Every day that I went to work, I walked past the stack of Apples in the warehouse. On the boxes there were green stickers that said "REFURBISHED." I was with COMB for only three months, but what I learned about the company and its channels of acquisition made me wonder whether it really got all its products directly from the manufacturer.

One other item of interest about the Apples: We could not honor Apple's rebates on peripherals with sales of these systems.

(name withheld by request)

IN SUPPORT OF THE IIp

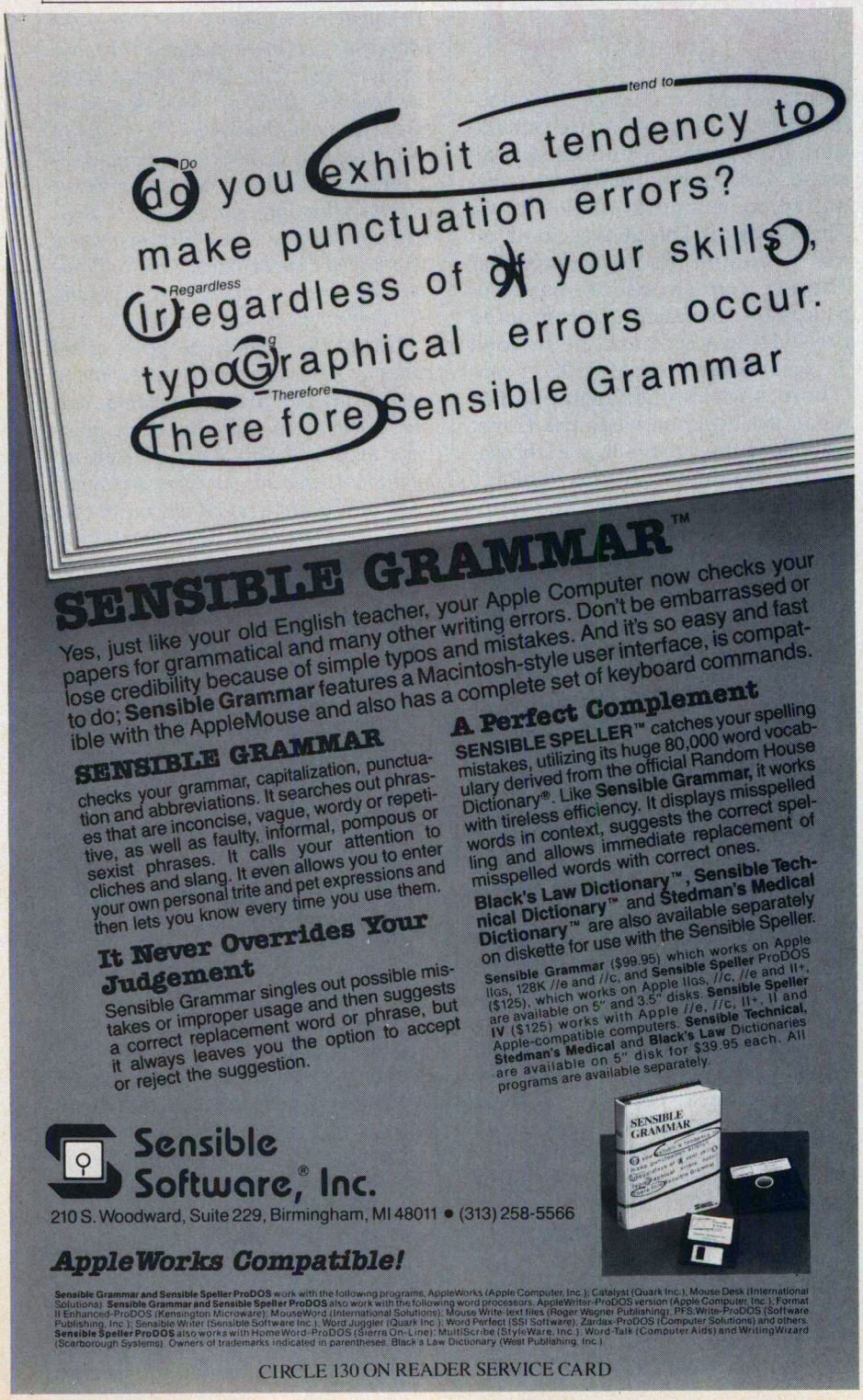
Dear *A+*: David Thornburg's "An Apple for the Student" in the April issue was nothing short of overdue. Apple would be doing itself and all educators a great service by making a truly personal educational computer.

Now that Apple seems to be coming out with all kinds of new equipment for business, it might consider this kind of computer for that market also. I have longed for something that I could use on the road and for doing research. As a director of computer education, I hear from time to time that we should be using MS-DOS machines because that is what business uses. I have to wonder why Apple doesn't come out with a IIp to attract this market. If Apple really wants to get into the business market, this truly personal computer would have a big impact.

William Brescia
Philadelphia, MS

NO IIGS FOR JET

In our May 1987 "Entertainment" column, we erroneously reported that SubLogic's Jet runs on the IIGS. Jet currently runs on the Apple II Plus, IIe, and IIc, but not on the IIGS.



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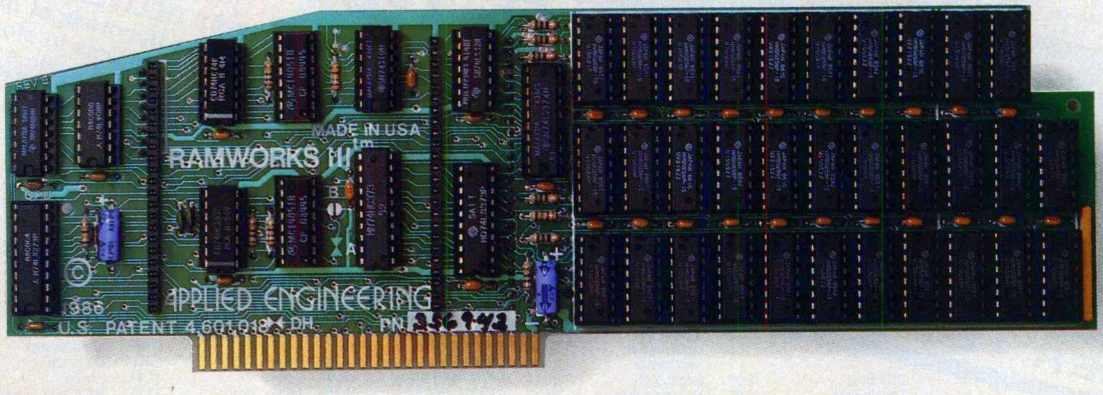

With battery backed RAM port, RGB port, increased memory capacity, full software compatibility and more compact design, RamWorks III is a generation ahead.

RamWorks III is the newest 3rd generation RAM card for the Apple IIe. It incorporates all of the technology and improvements that years of experience and over a hundred thousand sales have given us. By selling more memory cards than anyone else and listening to our customers, we were able to design a memory card that has the ultimate in performance, quality, compatibility and ease of use. A design so advanced it's patented. We call it RamWorks III, you'll call it awesome!

The AppleWorks Amplifier.

While RamWorks III is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks III does. Naturally, you'd expect RamWorks III to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks III does. With a 256K or larger RamWorks III, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

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RamWorks, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks III couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, Pro-Filer, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks is even compatible with software written for Apple cards. But unlike other cards, RamWorks plugs into the IIe auxiliary slot providing our super sharp 80 column text (U.S. Patent #4601018) in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

RamWorks III is compatible with all Apple IIe's, enhanced, unenhanced, American or European versions.

Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks III continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks III has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks III by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for up to 20 years.

It Even Corrects Mistakes.

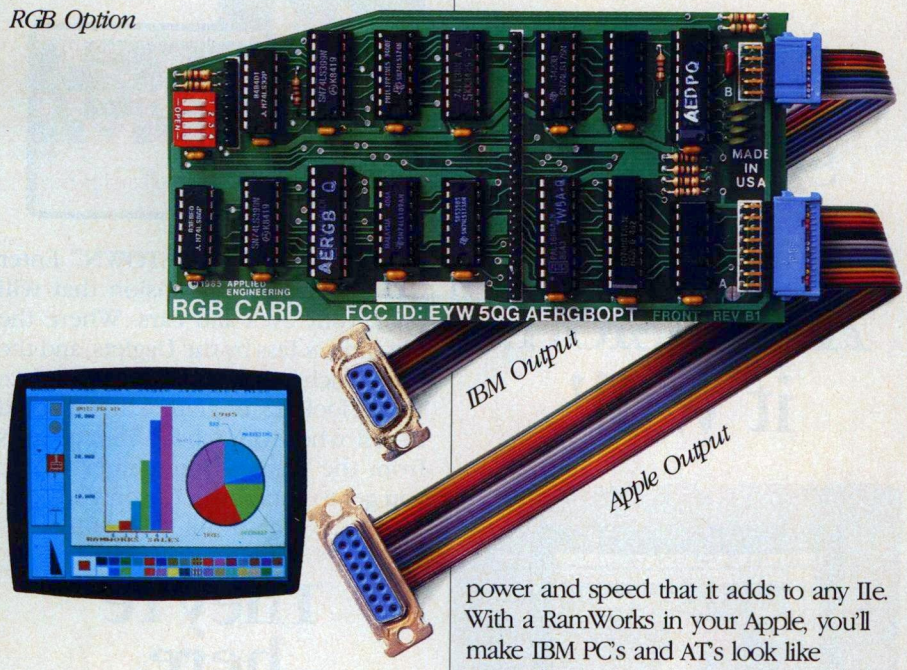
If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks and with good reason. Some others combine RGB color output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB

Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks RGB option is more than just the ultimate in color output because unlike others, it's fully compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks with no slot 1 interference and remember you can order the RGB option with your RamWorks or add it on at a later date.

RGB Option



True 65C816 16 Bit Power.

RamWorks III has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks is king of the hill."

"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak, the creator of Apple Computer

Apple experts everywhere are impressed by RamWorks's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks in your Apple, you'll make IBM PC's and AT's look like slowpokes.

Quality and Support of the Industry Leader

RamWorks III is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

It's Got It All

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- Expandable to 1 MEG on main card
- Expandable to 16 meg with expander cards, with NO slot 1 interference
- Can use 64K or 256K RAMs
- Powerful linear addressing 16 bit coprocessor port
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software
- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs in memory at once
- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors
- Built-in self diagnostics software
- Lowest power consumption (U.S. Patent #4601018)
- Takes only one slot (auxiliary) even when fully expanded
- Socketed and user upgradeable
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

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RamWorks III with 512K	**$249**
RamWorks III with 1 MEG	**$329**
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RamWorks III with 2 to 16 MEG	**CALL**
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RGB Option	**$129**
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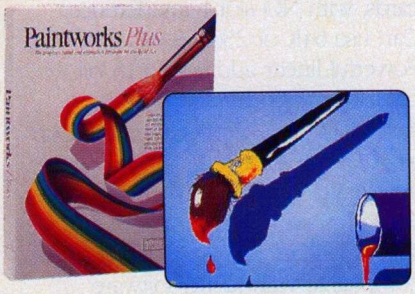

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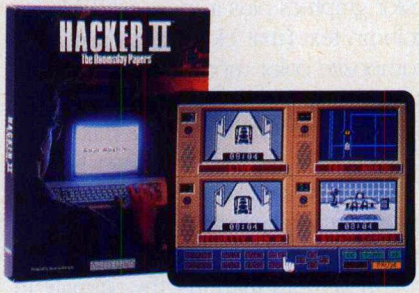

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CIRCLE 208 ON READER SERVICE CARD

BY LISA RALEIGH

NewsPlus

You can add Growing Sales to the list of things GS is said to stand for: The IIGS has grabbed 40% of the Apple II sales pie, outselling both the IIe and IIc.

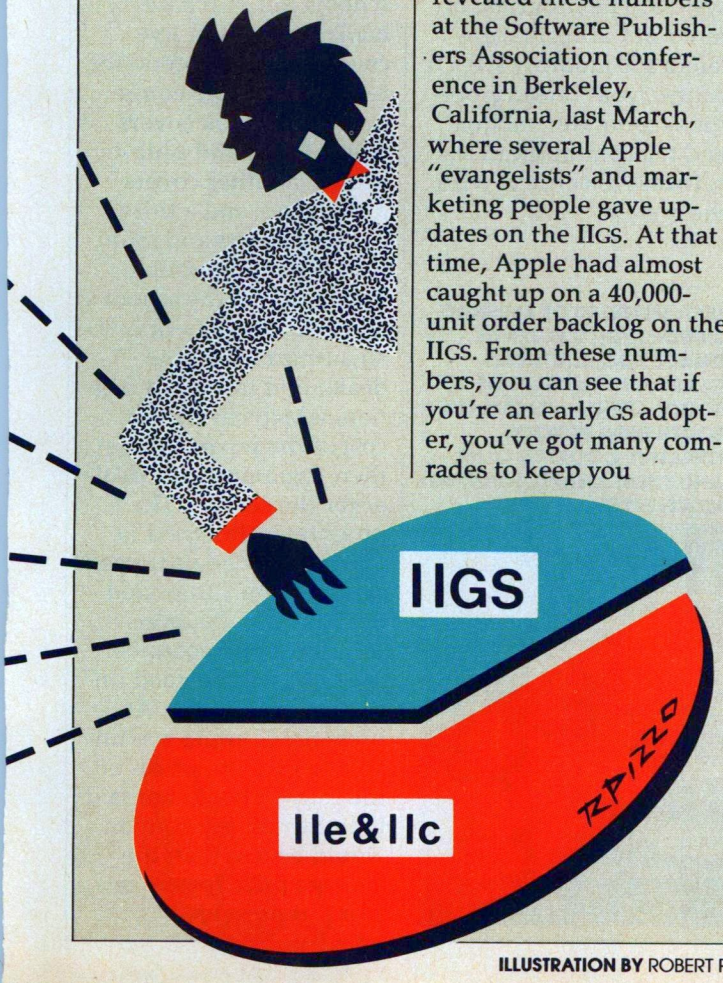


ILLUSTRATION BY ROBERT PIZZO

GS STANDS FOR . . .

Besides *graphics* and *sound*, GS has been said to stand for many things (Great Software, Going Slowly, etc.). Now let's add *Growing Sales* to that list. In fact, the IIGS comprises 40% of all Apple II sales and is outselling the IIe and IIc, according to Tom Virden, Apple's product marketing manager for the IIGS. Virden revealed these numbers at the Software Publishers Association conference in Berkeley, California, last March, where several Apple "evangelists" and marketing people gave updates on the IIGS. At that time, Apple had almost caught up on a 40,000-unit order backlog on the IIGS. From these numbers, you can see that if you're an early GS adopter, you've got many comrades to keep you company while things are Going Slowly waiting for Great Software.

The delays in software are due to the newness of the IIGS and the fact that Apple is still working on many key components of the system software. At this update session, consumer marketing manager Neil Amsden reported on the progress of several of these critical components. By the time you read this, Apple should have released the print manager, font manager, and QuickDraw utilities for the IIGS and may even have released the new system disk with Version 2.0 of the ProDOS 16 operating system. Next on the list is the Finder, which will manage the IIGS "desktop." According to Amsden, the Finder was scheduled to be "frozen" in June and shipped in September.

Then there are the sound tools. Among the system-software pieces in limbo, these have been the most delayed, because Apple has rethought its sound strategy. Since releasing the Macintosh II, with its phenomenal sound capabilities, Apple has decided to handle sound in a way that will allow developers to use the same high-level routines to write software for both machines. Apple also plans to release text-to-speech sound tools, allowing developers to create speech routines more easily.

Other Apple representatives talked about marketing and promotion plans. Apple has kept pretty quiet about the IIGS on this front, since the demand had been so strong that supply has only recently caught up. Now you can expect an onslaught of television and print advertising, however, along with mass mailings to lure later adopters into the GS fold.

DELUXE PAINT

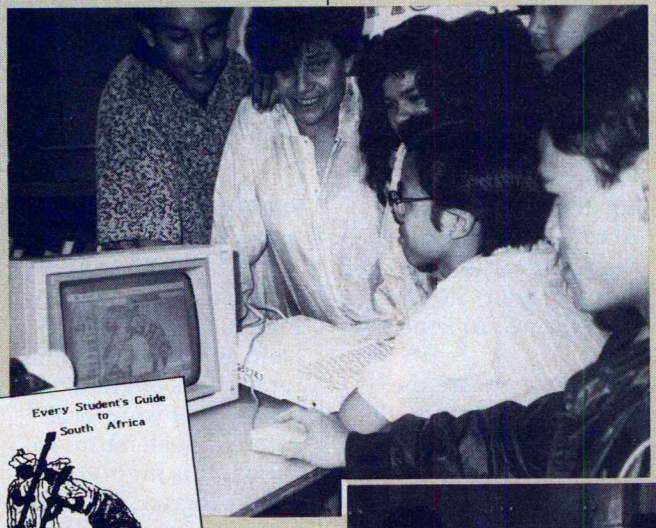
By the time you read this, Electronic Arts' $99.95 DeluxePaint II program for the IIGS ought to be available at your local Apple II dealership. To launch this high-end paint program, EA is offering DeluxePaint II for $49.95 to people who already own another IIGS paint program. To receive this upgrade, you need to send in the front cover from the package you currently own. EA is also throwing in a bonus clip-art disk with DeluxePaint and is releasing three other art disks at the same time.

NewsPlus

DESKTOP-PUBLISHING AWARDS

Apple Computer has expended lots of effort to promote the Macintosh as the premier desktop-publishing machine, but the company graciously acknowledges that the Apple II also deserves a nod for its capabilities in this area. Actually, the nod goes to three groups of students who were judged to have the best Apple II-produced newsletters in a contest held in Southern California. The contest was open to students in kindergarten through 12th grade, with awards for both Apple II and Macintosh entries in three age groups: elementary, junior high, and high school. A panel of judges from several local universities made the decisions, and the first-place winners got their pick of an Apple IIGS or a Macintosh, donated by Apple Computer.

The Apple II winners were South High School in Torrance, for its report "The Creative Cooking Club: A Special Report on Independent Living Skills Training for the Developmentally Disabled"; Berendo Junior High School in Los Angeles, for its study guide entitled "Every Student's Guide to South Africa"; and Hebrew Academy Lubavitch in Westminster, for its Hebrew newsletter.



LEFT: MEMBERS OF BERENDO JUNIOR HIGH'S SEVENTH GRADE SOCIAL STUDIES CLASS AND THEIR GUIDE TO SOUTH AFRICA. BELOW: THE SOUTH HIGH SCHOOL CREATIVE COOKING CLUB AND THEIR AWARD-WINNING NEWSLETTER.

ON-LINE BUSINESS BANKING

Although home banking seems to have gone nowhere in a hurry, Bank of America keeps plugging away at on-line banking services. The new twist, though, is that BofA is now targeting small businesses for such services.

BofA now offers a program called the Business Connection that lets small businesses call up BofA's computers from 6 A.M. to midnight to review their statements, transfer money between accounts, and make payments directly to creditors that are also on the system. The program, offered in California, entails a $50 monthly fee. Of course, you'll need a personal computer, modem, and telecommunications software to connect with the system.

REPAIR COUPONS

Apple has just begun selling coupon books, to its educational accounts, that will cover certain types of repairs. Under a program called the Apple Repair Coupon Service Program for Education (ARC), schools can purchase books containing five coupons that are good for repairs on Apple equipment. One book covers Apple CPUs and plug-in boards, another covers disk drives, and a third covers printers and monitors. When something breaks down, the school takes the equipment in to an authorized Apple dealer and turns in a coupon, which covers the cost of the repair. Apple then reimburses the dealer for the service. The program is designed to encourage schools to seek service from authorized dealers only. Coupons sold through September 30, 1987, will be good until August 31, 1989. At press time, Apple was unable to give the prices of the coupon books but said that the cost per coupon would be less than the average price for the repair it represented.

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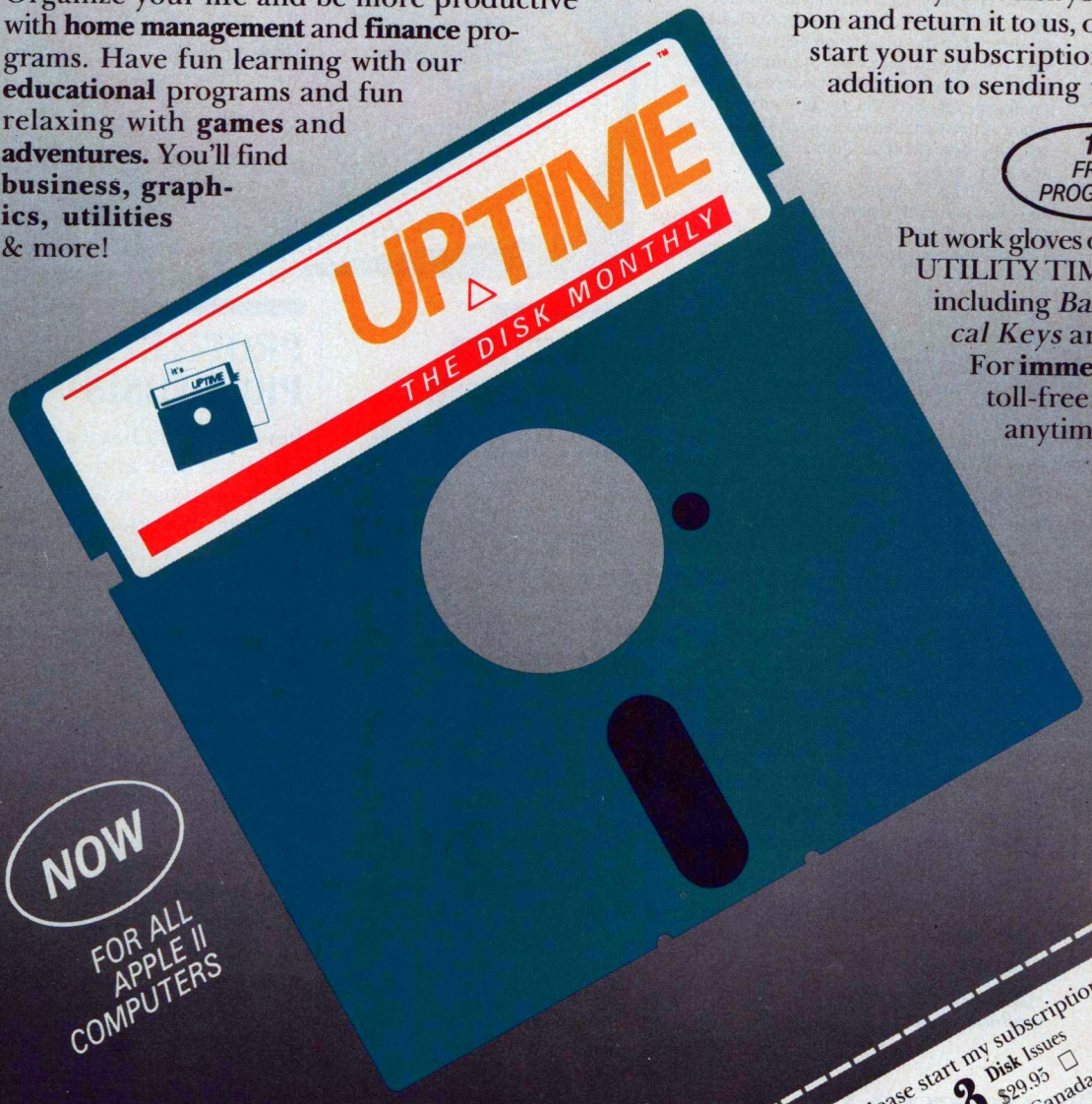

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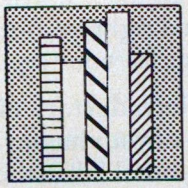

Visualizer IIe

Req. Apple IIe/IIc/ IIGS. AppleWorks optional.

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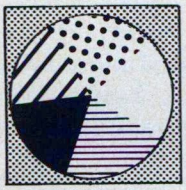
The graphic link to AppleWorks. Dazzle your boss, teacher, and friends. Produce business graphs from AppleWorks spreadsheet data or from within Visualizer itself. Graph types include pies, exploded pies, bars, lines, stacked-bars and scatters. Then the imagination begins because now you can customize your creation. With the overlay feature, you can display several different graph types at once. Add background pictures (such as those created from DazzleDraw), place text anywhere (multiple fonts and sizes), scale the Y axis, as well create 3-D graphs (pie, bar and stacked-bar). Prints in B/W or in color on the ImageWriter II...supports over 50 printers and interface cards. Not copy protected for ease of installation to hard disk drives or RAM disks. Version 1.2.



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Req. Apple IIGS w/ 512K & 3½" drive. AppleWorks optional.

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"If this program doesn't become an industry standard nothing will. Visualizer creates color business graphics directly from AppleWorks spreadsheet. This is not an ordinary graphing program..." Phil Inger Electronic Learning (2/87)

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NewsPlus

ANOTHER APPLE FOR THE TEACHER

In past years, Apple has offered teachers rebates on systems they bought for their personal use through its "Apple for the Teacher" program. Now Apple is making an even more generous offer, enabling teachers and administrators to get prices close to those that are offered to schools through Apple's Educational Purchase Program (EPP). Teachers affiliated with schools that buy Apple computers under this program will be eligible to buy IIe, IIc, IIGS, Macintosh Plus, and Macintosh SE systems directly from Apple at the school's discount price (typically in the 20%-off range). The IIe-to-IIGS upgrade is included in this arrangement. These discounts beat the Apple for the Teacher rebates, which offered a maximum of $200 back for a Mac and $75 for a IIc.

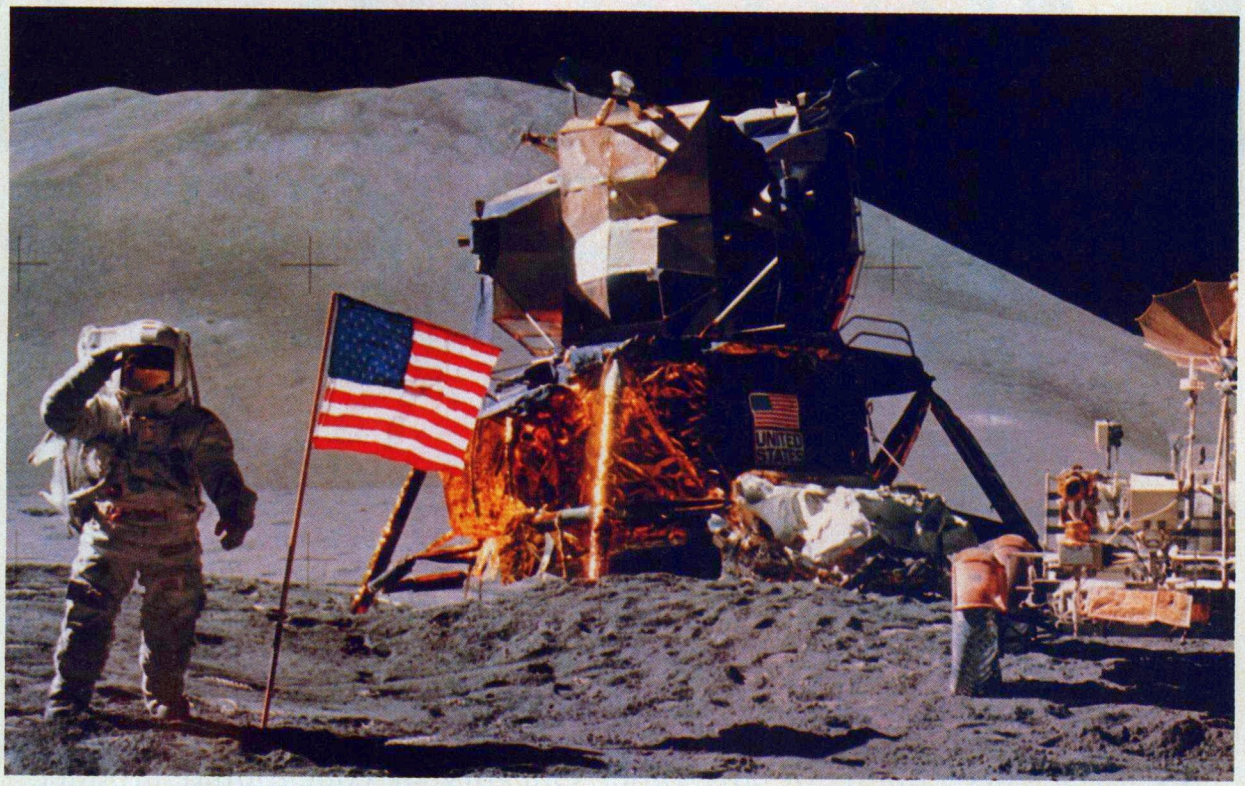
PROFILE PROGNOSIS

Beware if you have a ProFile hard disk and attempt to use it with a IIGS (or upgraded IIe). Apple has warned its dealers that the IIGS and ProFile I/O card don't necessarily get along well. Seems that, without certain modifications, the card can trash data on your hard disk. Be sure to ask your dealer for help before connecting these two pieces of hardware.

CORRECTION

In our April 1987 telecommunications cover story, we incorrectly identified MouseTalk and Point-to-Point as capable of VT-100 emulation. Neither of those programs has that capability. Also, USRobotics provides a two-year limited warranty on its modems, with an additional two years available for $15. USRobotics' number is (800) 982-5151. +

THE AMERICAN WAY TO THE TOP



This July 4th, we at Applied Engineering hope that all Americans will take time out to ponder who and what we are.

It is hoped that we can remind ourselves what it means to be an American.

We invented the telephone, the electric light, the phonograph, and the airplane. Americans invented the first vacuum tube, transistor and the integrated circuit, without which the personal computer would have been impossible. Over 95% of the world's new inventions are invented by Americans. We lead the world in all phases of technology; electronics, physics, chemistry, health science, space and robotics. We've sent men to the moon, landed a robot on Mars, and sent our probes out across the galaxy! Americans by their very nature are inventors, thinkers, winners and doers.

America is a country where two young men started a company in their garage and three years later Apple Computer became the industry leader. Applied Engineering started much the same way and we became the leading Apple peripheral manufacturer, with no outside sales force, no marketing strategy, and no commissioned sales people.

Our business plan at Applied Engineering is simple. BE THE BEST. That means producing tomorrow's peripherals today, it means hard work, high quality, total dedication to Apple Computer and good service at competitive prices.

While some other guys are losing the ball game . . . we're adding to our roster. In the past few months, we've added 6 new products to our line up for a total of 41 and we're working on more. We've added more order lines and more knowledgeable people to serve you.

While others look to the Orient for solutions to their engineering and manufacturing problems, we at Applied Engineering feel differently because we know America's inventive past and her inventive future and we're excited.

To quote Dr. Robert Goddard in a letter to H. G. Wells, "There can be no thought of finishing, for 'aiming at the stars,' both literally and figuratively, is a problem to occupy generations, so that no matter how much progress one makes, there is always the thrill of just beginning."

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APPLIED ENGINEERING

The Apple enhancement experts.

COVER STORY *BY MIKE MARKOWITZ*

DISCOVERING SCIENCE

With science, math, or any other category of educational product, teachers can use their Apples to expand their portfolio of teaching methods. Especially useful are science packages that let you turn your Apple II into an interactive science laboratory. As part of *A+*'s continuing coverage of educational products, here's a look at hardware and software that transform the Apple II into a science lab.

A bright spot in science education is the increasing availability of computer-based tools for teachers of physics, chemistry, and biology. With good software and hardware, even non-specialist instructors can help learners explore the forces of nature as well as experiment creatively and think critically about cause and effect.

A whole genre of science simulation and drill-and-practice software is available, but for the purpose of this article, I'll look only at products that actually add instrumentation to your Apple to turn it into a miniature science lab.

You can take two approaches to the problem of connecting an Apple II-series computer to an external instrument or device. The easy way is through the joystick port (or, if you prefer, the game paddle/mouse connector), which limits the designer to 16 pins on the II Plus or IIe and a meager 9 pins on the Apple IIc. This means you cannot pull much power through the line, so batteries or external power supplies may be necessary for anything ambitious. The other method of connecting—going through a slot on the motherboard—gives a designer 50 pins to play with and full access to the system bus. This approach requires a circuit board, however, and even a very simple board represents a major investment in design and production costs. It also excludes all those slotless IIc owners from the potential market. Most of the products I'll review here work through the joystick port. In most cases, owners of Apple clones can expect compatibility problems due to differences in timing, video firmware, or other factors.

Some of these products are specifically designed and marketed for schools. Others are aimed at home-computer hobbyists but have significant potential for teaching and learning. Any of them can serve as the basis for a high-school science project. I've listed the products in this article by publisher, since they tend to fall into groups of related or compatible titles.

BRODERBUND

The Science Toolkit series started with Brøderbund president Doug Carlston's determination to create a hardware extension for the Apple II series that would let kids conduct real experiments, rather than just on-screen simulations. "The product was something that Doug and Gary (Carlston) and I all wish we'd had as kids," says designer Lauren Elliott.

The series consists of a Master Module and two add-on modules: Speed and Motion, and Earthquake Lab. A third module with experiments on human physiology is under development. The Master Module was designed with "hooks" to permit easy expansion.

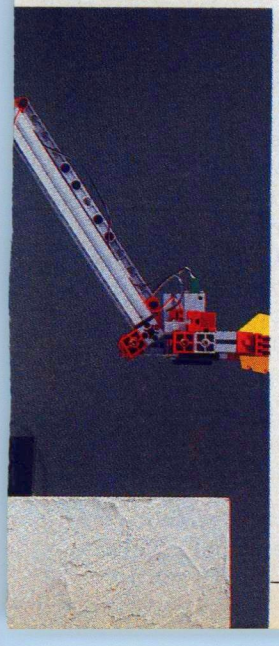
Science Toolkit Master Module

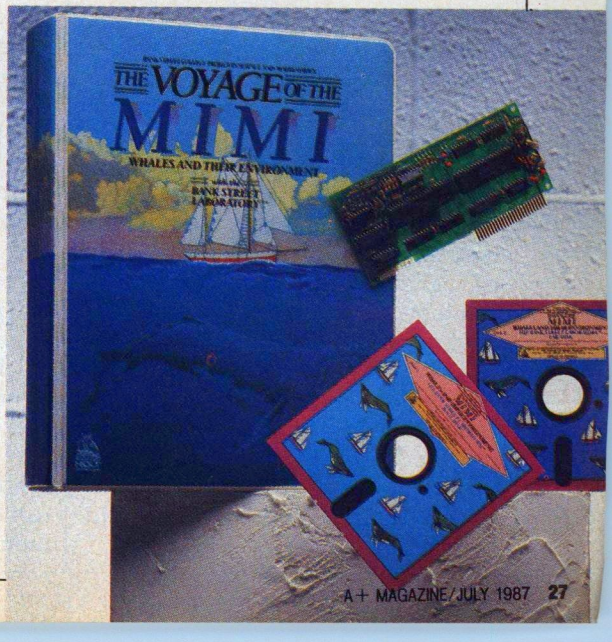
The Science Toolkit Master Module includes a black box the size and weight of a cigarette pack. It plugs into the joystick port with a DB-9 connector on a 32-inch cable. It has four inputs: two for analog signals and two for digital signals. (All use standard RCA-type phono jacks). Remarkably, nothing much is inside the box, except a little circuit board with two resistors. Only six of the nine pins are actually in use, since everything happens through software control.

Two simple instruments provide the analog input. The "temperature probe" is a thermistor, a device that varies its electrical resistance in response to any temperature changes. The "light probe" is a cadmium sulfide photocell similar to a photographer's light meter. The temperature probe is accurate to a tenth of a degree Fahrenheit (it also displays the Celsius scale). The light probe measures intensities of 0–500 footcandles.

The software displays the input from these instruments with attractive color graphics. It also uses the computer's internal "clock" to provide a timer accurate to .01 second. You can start and stop the timer from the keyboard, or you can use the input from one of the probes to trigger it.

The Science Toolkit software includes a "strip chart recorder" that can sample and print out up to 4000 measurements over periods ranging from 5 minutes to 24 hours. The program prints with just about any Apple-compatible text printer—no graphics capability is necessary. You can use a second disk drive to save data, and you can access a full set of disk utilities within the program to format a disk and load, save, delete, or





catalog your experimental data.

The look and feel of the software is based on the metaphor of a lab notebook. Menu screens are set up like pages, with check marks indicating the selected options.

A 128-page manual provides 27 experiments that employ common objects and household materials to demonstrate some important laws of physics. The timer, for example, replicates Galileo's famous experiment with falling objects. The package also includes some experiments in plant growth that investigate the effects of heat and light, and some kitchen chemistry. A school edition of Science Toolkit includes a comprehesive teachers' guide with detailed instructions for using the package in the classroom.

The documentation emphasizes safety, as befits any product for young people. The software triggers an audio alarm and pops up a dialog box if the temperature probe reads higher than 140 degrees Fahrenheit. Other dialog boxes caution users when they face any risk of losing data. Science Toolkit formats data disks with a fast custom DOS that does not look like DOS 3.3 or ProDOS.

Unlike some of the other programs reviewed here, Science Toolkit works with the Laser 128 and the Franklin Ace 1000. To use the interface box with an early Franklin or an Apple II Plus, you need an inexpensive adapter ($5.95, mail order) to connect the 16-pin motherboard socket to a 9-pin connector. The Apple IIGS requires a new version of the hardware, since it does not use the same kind of joystick port as earlier Apples do.

The low cost and pretty graphics might give an erroneous impression that this product is merely a science toy. Actually, Science Toolkit is functionally equivalent to scientific instrumentation costing 20–50 times as much. Like any good instrument, it can even be calibrated against a standard, if one is available. The software retains the correction factors.

Brøderbund would do well to publish technical specifications for the interface so that other makers could offer compatible devices. An inexpensive standard hardware interface for instrumentation would benefit everyone.

DISCOVERING SCIENCE

The Science Toolkit '. . . was something that we all wish we'd had as kids.'

Science Toolkit Module 1: Speed and Motion

This package is the first in a series of add-on modules that use the Science Toolkit interface box while providing additional hardware, software, and experiments. Along with the manual and program disk, it includes a second photocell, a cardboard photocell holder, a balloon-powered miniature car, and some balloons.

The software provides two new tools: a speedometer and a tachometer. The cardboard holder keeps the two photocells six inches apart. When an object passes in front of the first photocell, a timer switches on; when it passes in front of the second photocell, it switches off, and the speed of the object instantly appears on the computer screen. You can select metric or U.S. units.

The 48-page manual has three speedometer experiments that teach concepts of acceleration, deceleration, thrust, and payload. The experimental car snaps together easily from 18 plastic parts. Parts of the car double to make a pendulum for experiments with the tachometer. The tachometer measures cyclical motion at any rate between 10 and more than 6000 rpm. The experimental setups require that the moving object interrupt a light source, and it takes some trial and error to get things working right, because of the instruments' sensitivity. Both the speedometer and the tachometer use the digital inputs on the interface box.

Speed and Motion includes five experiments with the tachometer, teaching the concepts of angular momentum, visual persistence, and pendulum motion. The package is most suitable for the high-school physics curriculum, but it can easily find applications in elementary-school science teaching. To operate it, you need the Science Toolkit Master Module, and it has the same hardware requirements. The software is copy-protected—an odd choice, since the disk is useless without the rest of the package. Backups are $10, which seems rather steep, considering that the major customers for the product are schools.

Science Toolkit Module 2: Earthquake Lab

The second module in the Science Toolkit series provides parts for constructing a "seismoscope," a sensitive instrument for detecting vibration. The package also includes a program disk, a 38-page manual, and a sheet of assembly instructions. You use the package with the Science Toolkit Master Module, and it has the same hardware requirements.

The seismoscope is rather tricky to assemble. It took me about two hours, including time for the glue to dry. It consists of a plastic base plate with a 12-inch post supporting a pendulum. A thread attaches the pendulum to a bent-wire lever arm that moves a shutter across the mouth of a tube that holds a photocell. Any slight vibration of the base plate causes a fluctuation of the light the photocell receives, and the fluctuation appears on the screen as a squiggly line, just like what the moving pen of a real seismograph or earthquake detector produces. If it's properly built and adjusted, the seismoscope can "magnify" the motion of the ground by a factor of up to 2000, making it as sensitive as some of the largest and most costly mechanical instruments.

Most of the seismoscope is built of cardboard, a material not noted for stability. You assemble it with white glue, and a D-cell dead battery is recommended as a pendulum weight. Constant tinkering and fine adjustment are necessary to get the device operating. It tends to drift or sag out of alignment overnight. It is an ingenious device, marred by poor engineering. A major problem is the bent-wire lever-arm, which pivots on the base plate, held in place by glued cardboard squares. You get either too much friction or too much wobble.

Considering that real seismic instruments use knife-edged jeweled

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DISCOVERING SCIENCE

Earthquake Lab is ideal for courses at almost any level.

bearings, it is remarkable that the Earthquake Lab works at all. The cardboard tube that holds the photocell is too narrow for the photocell that came with my review copy of the Master Module. Later photocells, such as the one that came with the Speed and Motion module, have a smaller bezel, and fit perfectly. The Earthquake Lab itself does not provide a photocell.

The Earthquake Lab manual includes three experiments. The first investigates the relationship between the recorded intensity of a quake and the distance from the "epicenter." You perform the experiment by dropping a weight from a constant height onto the table where the seismograph sits, gradually moving the point of impact closer. The second and third experiments place the seismoscope on a variety of different surfaces such as wood, glass, or foam rubber to explore the effects of the underlying material on the transmission and magnitude of the shock.

Earthquake Lab is ideal for courses or learning modules in earth science or geology at almost any level, from elementary school to college. You can also use it to create demonstrations or student projects in architecture or structural-engineering classes. Although interest in quakes is largely prevalent on the Pacific coast, the manual reminds readers that the strongest earthquakes in American history were in the vicinity of New Madrid, Missouri, in the winter of 1811–1812.

The program disk is copy-protected—a particularly bad idea for products marketed to schools, especially when the program requires another program (the Master Module) to operate.

FISCHERTECHNIK COMPUTING

Artur Fischer might be considered the world's greatest toy engineer. Toys are taken seriously in Germany, and the Fischertechnik line of high-tech educational playthings has a reputation for meticulous design and craftsmanship. The computer product line is rather complex, including an interface box, several electromechanical kits, and software. I built the Training Robot kit.

Training Robot

Assembly of this beautifully engineered German import should be no problem for any youngster whose hands have the brute strength of a middle-heavyweight and the delicate precision of a neurosurgeon. The result is a three-axis robot that can rotate on its turntable, extend its jointed arm, and grip small objects and place them neatly anywhere within its reach.

When you open the box, you are confronted with hundreds of plastic and aluminum parts nested in styrofoam or sealed in little plastic bags—a bewildering array of beams, blocks, axles, wedges, shims, gears, snap rings, and coils that look like plastic macaroni. The whole assembly rests on a slotted base plate 7.5×10.25 inches square and stands about a foot high at the "shoulder." Fortunately, the assembly instructions are clearly illustrated. Unfortunately, snapping some of the parts together takes a lot of muscle. When you press-fit the wheels onto the axles, you can be sure they are not going to come off any time soon.

I was able to complete the mechanical assembly without breaking any of the parts or my fingernails, but it was a close call in a few instances. Whenever you put complex mechanisms together, you run into a nasty problem called "tolerance buildup." A slight inaccuracy here plus a little error over there can add up to enough misalignment to make the whole machine freeze up, bind, seize, cough, choke, and die when you apply power. You must align the Fischertechnik Training Robot precisely to the millimeter, or else you are going to get an object lesson in tolerance buildup when the motors turn on.

The kit includes four tiny DC motors sealed in plastic blocks, four indicator lamps that light up when the corresponding motor is energized, five microswitches, and three ingenious "photo-interrupters" that provide rate feedback to the computer. Wiring everything together is a challenge. You have to separate a long, 20-wire ribbon cable, snip it into many parts, and strip it precisely. You get a bag of red and green solderless terminals that you install onto the stripped wire ends with a tiny jeweler's screwdriver that comes in the kit. You must coax many of the cable runs through a one-inch hole in the center of the turntable, a task that requires tweezers, dexterity, and patience.

The Interface

The Fischertechnik Apple interface, sold separately, consists of a circuit board sealed inside a transparent plastic box. A ribbon cable connects it to the 16-pin joystick port on the II Plus, IIe, or Franklin. The interface does not work with the IIc or Laser 128. Some of the signal lines the interface uses also connect to the 9-pin socket on the rear of the Apple IIe. It also has a ground terminal and two sets of terminals for the 9-volt DC power supply. The power supply I received did not indicate which terminal was positive, and inevitably I hooked it up backwards the first time, but no harm came to the interface.

I received one disk of BASIC programs with the interface, and the package included a coupon to mail in for a second disk of programs (which arrived very quickly). The software is a rather confusing collection of programs. Some apply to the Training Robot, some apply to other kits. Some are documented, some are not. The "driver" program uses machine language to speed up its operation. The most useful program in the package was ROBOT.TEACH, a menu-driven utility that lets you program each motor individually and stores the sequence of commands on a DOS 3.3-formatted disk. The software is not copy-protected and requires only 48K RAM. With some trial-and-error, I was able to program the robot to pick up plastic blocks and stack them. Of course, I had to place the blocks in precise starting positions for this trick to work, since the robot has no "vision" or "feelers."

Despite the excellent illustra-

DISCOVERING SCIENCE

The Training Robot is ruggedly built and surprisingly strong.

tions, the documentation that accompanies the Training Robot is some of the worst I have ever seen for a computer product. Part of the problem is the too-literal translation from German—e.g., "It should be said that the control of an output is effected by calling in a computer language program."

The separate booklet that accompanies the interface is in more comprehensible, idiomatic English, but flipping back and forth between two manuals is confusing.

The Fischertechnik Computing kits are highly suited for hobbyists with some experience in kit building who are willing to dig into the code and puzzle out how it all works. The Fischer line offers a tremendous array of compatible components that you can use to modify and customize the basic model. The Training Robot is quite ruggedly built and surprisingly strong, but once you've assembled it, it's not really meant to be taken apart again. It is an excellent training device for any electrical-engineering or industrial-arts program in robotics. If the documentation were improved and repackaged in a tutorial format, it could also be appropriate for more elementary computing classes.

MULTIBOTICS

The concept of Multibotics is a creation of Steven Witzel, an electronic engineer, and Bruce Carver, a mechanical engineer. Their goal was "to create an environment where people could play with and learn about computers." Not all of the projects are truly robotic, but the term is descriptive of computer connection to external electrical and mechanical devices.

Multibotics MB230 Robotic Workshop and B100 Interface Unit

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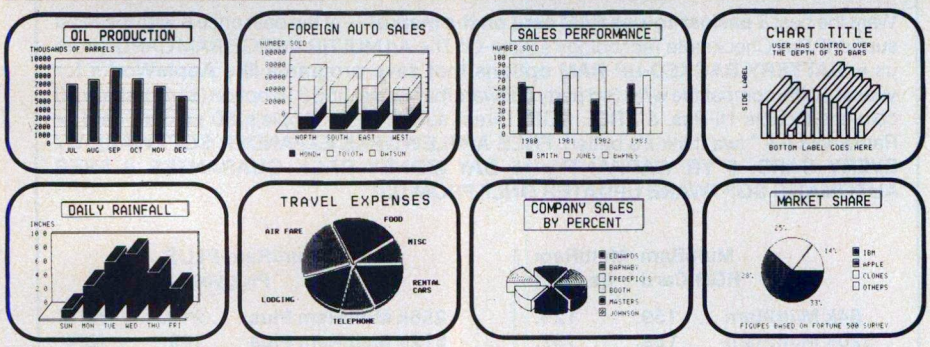

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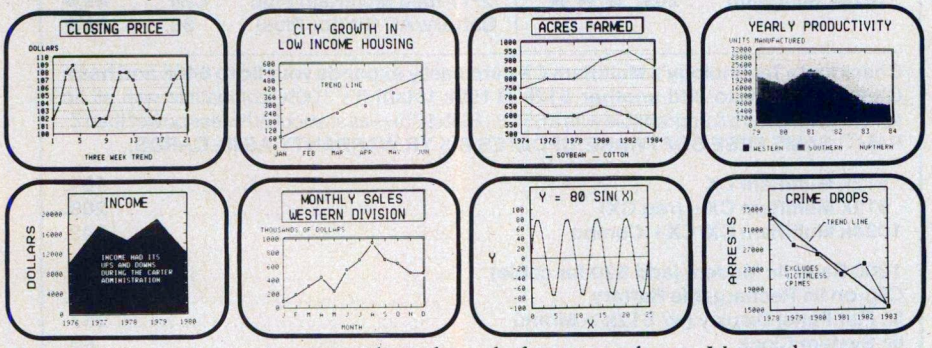

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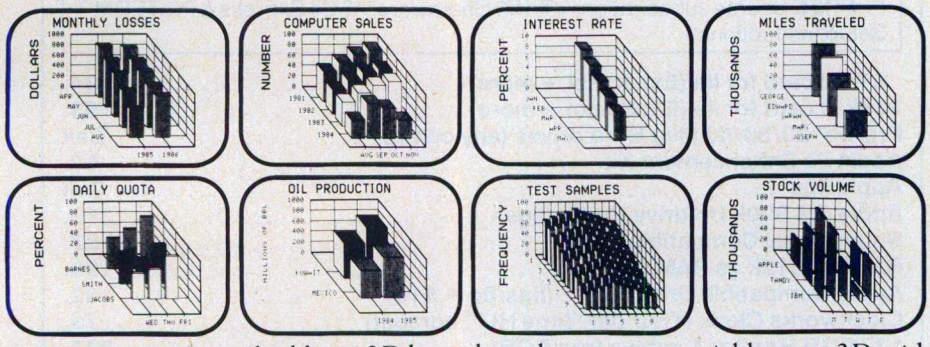

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DISCOVERING SCIENCE

The Multibotics manual sets a standard of clarity.

the "Capsela" family of modular motorized toys. The interface connects to the computer with a small circuit board that can plug into any slot (slot 3 is recommended). The board is a parallel interface based on a single socketed 40-pin Hitachi HD468B21P chip. The batteries (six AA alkaline cells, not included) power the motors. The Workshop is compatible with the Laser 128 but, at this writing, has not been tested with the Apple IIGS (the tech-support person at Multibotics thought the different clock rate of the IIGS could be a problem).

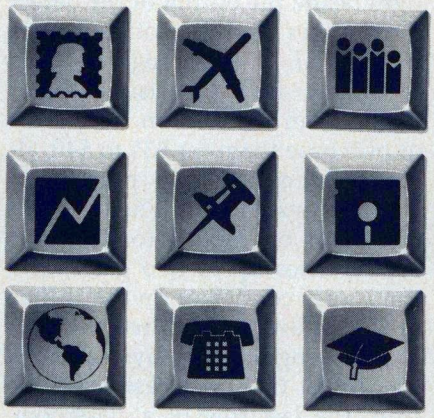
The Multibotics B100 Interface Unit is a flat plastic box (4 × 7.5 inches) with a row of eight LEDs, output and input phono jacks, a selector switch (meter/sensors/audio), a power switch, and a four-pin connector meant for future enhancement devices. A ten-foot ribbon cable leading from the interface carries three sets of motor leads and an infrared emitter/detector. The B100 can function as a voltmeter, an oscilloscope, and an analog-to-digital converter, among other things.

The Capsela modules are a European import, comprising a series of sturdy, interlocking, transparent, plastic spheres. The basic Workshop also includes two DC motors, two reduction-gear capsules, a worm-gear capsule, some axles, and a variety of static and rotary connectors. Since these are all "open stock" items, you can order replacements or additional components by using a form that comes with the package.

A 135-page spiral-bound illustrated manual documents 50 different projects that you can assemble with the Workshop. The manual is crudely printed, but it sets a standard of textual clarity, accuracy, and completeness that many other software publishers might envy.

The projects, organized by cate-

How to choose an online service



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gory, are Motors and Gears, Generators and Feedback, Digital Electronics and Programming, Light and Color, Counting, Measuring and Infrared Detection, Voltmeter and Electronics, Moving Vehicles, Electronic Speech, and Audio. Some of the projects are pure fun and easy to snap together, such as the "cars" that crawl across your desktop. Others are serious demonstrations of computer and electronic principles. Several advanced projects require the purchase of additional components available at any neighborhood electronics shop.

According to Jim Slade of Multibotics, a school version of the package is currently in preparation, with upgraded cabling and packaging and a new manual that is more closely tied to the standard science curriculum. The cabling needs improvement; it tends to become tangled unless you carefully tie back the unused leads in each project. The company is planning several ambitious add-ons for fall 1987, including an infrared remote-control module, a switching and relay module, and a robot arm.

The Robotic Workshop is suitable for any high-school electronics program. Some computer courses with a strong hardware orientation can also make good use of it. With future enhancements, it could become a strong competitor in the market for general-purpose science-lab instrumentation. The price is rather steep for casual home use, however.

VERNIER SOFTWARE

This small family business in Portland, Oregon, offers several technical hardware and software products for the classroom and lab. They include a temperature plotter, graphical-analysis software, interface boards, and a frequency meter. Vernier also publishes a delightful newsletter aimed mainly at physics teachers.

I reviewed one of the company's products, Precision Timer II.

Precision Timer II

This program lets you use the computer as an accurate and flexible laboratory timer. It has 14 different timing modes, most of which require the use of "photogates" to start or stop the timer. A photogate is simply a lamp with a light detector a few inches away.

DISCOVERING SCIENCE

Precision Timer II lets you use the computer as a laboratory timer.

When something interrupts the light beam, the output of the detector changes, and the software uses this signal. The photogates come separately from Precision Timer II—you can build them from a kit or purchase them for $35 to $40, already assembled, and plug them into the joystick port. The nine-pin connector on the IIc (or IIGS) accommodates up to two gates, and the 16-pin connector on the II Plus or IIe handles up to three.

The program displays times in *big* digits that are easily visible from the last row of a classroom. The package includes a full set of graphing, printing, and disk-file-management utilities. You can use this program for many of the same experiments that you can do with Brøderbund's Speed and Motion, only Precision Timer II allows more flexibility. Accordingly, it's a more difficult program to use.

The Apple's own internal clock is a crystal oscillator with a frequency around 1 megahertz, or one million cycles per second. Precision Timer II provides a calibration feature to allow for the minute differences between timing crystals in different Apples. The program does not work on the Laser 128, "because of a software problem" that can probably be patched.

The non-copy-protected software is a mix of well-documented BASIC and machine language. The 54-page three-hole-punched *User's Manual and Teacher's Guide* provides extensive technical notes and suggestions. Precision Timer II would be a delight for any high-school or college physics instructor. It is adaptable, well supported, and reasonably priced.

HRM SOFTWARE

This small company in Pleasantville, New York, has worked for several years with the National Science Teachers Association, the Technical Education Research Centers, and others. HRM's product support is first-rate. Disks are not copy-protected, and the company will replace them at any time, for any reason. The hardware carries a 60-day warranty (with replacement thereafter at nominal cost). You can call a toll-free telephone number for technical support.

Experiments in Science

This kit is built around an interface box that plugs into the 16-pin joystick port of an Apple II Plus or IIe. With a 9-pin adapter, you can use it with a IIc, but you won't get digital outputs. It requires only 48K of RAM, a decided advantage for schools with older Apples and no budget to upgrade them.

The package includes the interface box, a ribbon cable with 16-pin DIP plugs at each end, four extender cables, two temperature probes, a light sensor, a lamp, an LED, a program disk (DOS 3.3), and a 60-page manual. A recent upgrade added an ingenious heart-rate sensor, with its own special input socket on the interface box. Except for the heart-rate sensor, everything uses standard RCA-type phono jacks. The components are well protected in a flip-top cardboard box with a styrofoam insert and individual plastic containers for the smaller parts.

The interface unit is ruggedly built, with a thick plastic case and a metal faceplate protecting a small, hand-soldered circuit board. It provides four analog inputs, two digital inputs, and two digital outputs.

The 60-page illustrated manual, for teachers, shows a clear understanding of the high-school science curriculum. It includes detailed checkout and troubleshooting instructions and technical notes covering both the hardware and the software. The software is in BASIC, and the documentation is sufficiently detailed that advanced students can write their own application programs. A diagnostic program on the disk lets you confirm that everything is working correctly. According to a tech-support person at HRM, the product works with the Apple IIGS, but you have to plug the ribbon-cable connector into the interface box "upside down" and set the system speed to 1 MHz by pressing open-apple/Control/Reset.

The manual describes 12 experiments, each of which works with its own software module. You'll need some standard lab equipment and chemicals (not supplied by HRM) for the three chemistry experiments: Cooling Curves, Heat of Neutralization, and Reaction Rates. The physics experiments include Light Intensity, Kinematics, and Light-Energy Equivalence. The biology experiments are Heart Rate, Response Times, and Flicker Fusion. The earth science experiments include Insolation, Evaporation and Humidity, and an ingenious Weather Station. In some of the experiments, the program can graph the results on the screen, but it doesn't work directly with a printer.

Experiments in Science is suitable for any high school with an Apple II-series computer.

Experiments in Human Physiology

This package uses almost the same hardware as Experiments in Science but provides completely different software and documentation. The experiments include Response Time, Calibration of the Temperature Probe, Skin Temperature, Respiration Rate, Heart Rate, Psychological Stress (a crude lie detector), Exercise, and Biofeedback. The biofeedback experiments involve skin temperature and heart rate only.

The software is written in Transforth, a variant of Forth developed by Paul Lutus (author of Apple Writer), and is fully compiled for fast response. The Technical Notes include some sample programs in BASIC. The program provides a full set of utilities for saving data, displaying it, graphing it, sending it to the printer, and cataloging data files. The program works with any graphics printer interface. The 72-page manual includes a useful short bibliography.

Although it was designed for the high-school science or health curriculum, Experiments in Human Physiology can readily serve for college-level demonstrations; lab exercises; or student research in psychology, medicine, nursing, or physical education.

Cardiovascular Fitness Lab

Designed to help users study the operations of their own hearts, this package includes a small interface card, graphic menu-driven software, and a remarkable clip-on sensor that attaches to an earlobe or fingertip. One side of the clip contains a tiny lamp, and the other holds a light detector. When blood surges through the tissues, the amount of transmitted light changes, and the program uses this variation to compute a pulse rate.

On an Apple II Plus, the card works in any slot except slot 0. On the Apple IIe it works in any slot except slot 3 when an 80-column

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CIRCLE 109 ON READER SERVICE CARD

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Temperature Grapher would be at home in any Apple lab.

card occupies the auxiliary connector. The card also works in the single slot of the Laser 128 but does not work with the Apple IIGS.

A 34-page illustrated booklet explains the use of three main menus and provides detailed instructions for the Kasch Pulse Recovery Test, a simple measure of cardiovascular fitness.

The Plotting menu is for selecting a time interval (one minute to two hours) for graphically plotting your heart rate. The Histogram menu plots the frequency distribution of sampled heart rates over time. This rather esoteric data indicates how steady (or variable) the heart is. Plots on graphs are easy to print out. The Training menu, designed for aerobic-exercise training, provides options for setting a target heart-rate range (the "training zone") and desired minimum and maximum rates. An optional audio tone provides feedback, and you can have large digits displayed on the computer screen.

In addition to its obvious use in biology or health classes, Cardiovascular Fitness Lab can be a useful tool for athletes and coaches in sports that require endurance. The sensor has a five-foot cable, and a six-foot extension cable is available, so users aren't tethered directly to the computer.

Temperature Grapher

Temperature Grapher is one of a series of programs HRM developed in the summer of 1981 with funding from the Department of Energy. It provides a pair of temperature probes with extender cables that join to plug directly into the 16-pin joystick port of a II Plus or IIe. Packaged in a loose-leaf binder, Temperature Grapher includes a 20-page *Teaching Guide* and a program disk. You can use it for numerous temperature experiments such as plotting changes in temperature of a classroom overnight or comparing the effectiveness of different insulation materials.

The program offers a few simple menus and is equally appropriate for elementary grades and high-school or college science courses. Every menu includes a Help option. You can graph the output from one probe or both and save graphs to disk or print them. You can calibrate the probes, if a standard Celsius thermometer is available, and save the correction factors to disk.

The manual suggests a wide range of possible experiments to explore heat flow, evaporative cooling, change of state, heat capacity, and insulation.

Temperature Grapher is a simple, relatively inexpensive, no-frills tool that would be at home in any Apple laboratory.

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Bank Street is the Cadillac of this genre of science products.

under a grant from the U.S. Department of Education as part of a larger multimedia curriculum on whales and their environment called The Voyage of the Mimi. You can use the Bank Street Laboratory by itself, though, in any science curriculum from about fourth grade through high school, for experiments in temperature, light, and sound. The package is big, expensive, and of excellent quality, both technically and educationally. It is distributed by the Holt, Rinehart and Winston School Publishing division and comes in a rather complicated plastic storage case (13 × 9 × 3 inches!), complete with software (boot disk and program disk), teachers' manual (70 pages), users' manual (26 pages), circuit card with two cables, three connector blocks, loudspeaker, microphone, light sensor, lamp, two temperature probes, and two slides for light experiments (slit slide and diffraction grating).

The electronic components are safe in individual antistatic bags. I found it difficult to reclose the box unless I had everything perfectly nested and all the cables neatly coiled and tied.

You can perform almost every function in this program with only the space bar, the Return key, and the Escape key. The program uses the AppleWorks file-card metaphor, with the addition of menu bars as well as icons that indicate what devices are currently plugged into the circuit card. The connections to external devices are modular telephone jacks, which are a little less rugged than the phono jacks most other science-lab products use but are able to carry four signals instead of two.

The experiments focus on three phenomena: temperature, light, and sound. Students can easily grasp how these forces affect their own lives. The experiments require only a few familiar household objects—no special equipment or materials. The major menu options are all simple, fundamental operations: measure, compare, graph, and calibrate.

The screen design is clean and functional, and the program has excellent error-trapping. The documentation is aimed mainly at teachers with little previous computer experience. It includes detailed procedures for the experiments, lots of ideas for discussion and exploration, and very complete troubleshooting instructions.

Temperature can be displayed in Fahrenheit, Celsius, or both scales. Sound intensity is displayed in decibels and frequencies in hertz. Light intensity is displayed in footcandles. There is a beautiful experiment to measure the speed of sound and a utility that allows the student to draw the time-frequency graph of a sound and then play that sound through the loudspeaker. It is a cheap two-inch loudspeaker but still better than the speaker inside the computer or most monitors.

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BANK STREET LABORATORY	Physics, Chemistry, Biology, Earth Science (grades 4–8)	LOW	EXCELLENT

Any screen can be printed out if you have a graphics interface and know the "dump code" (usually Control-I,G). The printouts are big and bold, and any kid would be delighted to take one home. Any screen can also be saved to disk, either as a graphic image or as data (which takes much less space). A data disk can be initialized without leaving Bank Street Laboratory.

Bank Street Laboratory is the Cadillac of this genre of science products. For many schools it may be too much for the software and equipment budget. For the cost of one Bank Street Laboratory package, a school could buy four Science Toolkits, which offer nearly the same functionality for light and temperature but lack the audio capability. Despite the high price tag, Bank Street Laboratory is a superbly designed product that deserves serious consideration. ✚

Mike Markowitz is a computer engineer for a large Southern California aerospace firm. He has been writing about Apple software and hardware since 1983.

PRODUCT INFORMATION

Science Toolkit Master Module
Brøderbund
17 Paul Drive
San Rafael, CA 94903-2101
(415) 479-1170
List Price: $69.95; school edition, $89.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive; II Plus requires game port adapter (not supplied). Proprietary operating system; copy-protected; cannot use mouse.

Science Toolkit Module 1: Speed and Motion
Brøderbund
17 Paul Drive
San Rafael, CA 94903-2101
(415) 479-1170
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive; II Plus requires game port adapter (not supplied); Science Toolkit Master Module

Science Toolkit Module 2: Earthquake Lab
Brøderbund
17 Paul Drive
San Rafael, CA 94903-2101
(415) 479-1170
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive; II Plus requires game port adapter (not supplied); Science Toolkit Master Module

Robotic Workshop
Multibotics
2561 South 1560 West
Woods Cross, UT 84087
(801) 298-9077
List Price: $159.95
Requires: Apple II Plus, IIe, or IIGS; 48K RAM; 5¼-inch disk drive; one open slot; six AA batteries. DOS 3.3; not copy-protected; can use mouse.

CIRCLE 380 ON READER SERVICE CARD

Fischertechnik Training Robot
Fischer America
175 Rt. 46 West
Fairfield, NJ 07006

Packages

An at-a-glance comparison of the science programs reviewed in this article

EASE OF SETUP	EASE OF USE	OVERALL RATING	COMMENTS
VERY EASY	VERY EASY	EXCELLENT	Includes interface box, light sensor, temperature sensor, software
MODERATE	MODERATE	VERY GOOD	Includes second light sensor, balloon-powered car, software
DIFFICULT	GOOD	GOOD	Includes software and cardboard- and plastic-seismoscope kit; setup requires delicate adjustment
EASY	MODERATE	VERY GOOD	Circuit card, interface, software, and parts
DIFFICULT	MODERATE	FAIR	Beautifully engineered robot arm and interface; confusing software; electronic-kit assembly experience and familiarity with BASIC desirable
MODERATE TO COMPLEX	COMPLEX	VERY GOOD	Fourteen timing modes, accurate to .0001 second
EASY	EASY	GOOD	Includes interface card, pulse sensor, cable, and software
MODERATE	EASY	GOOD	Two temperature probes, light sensor, LEDs, pulse sensor, interface
GOOD	EASY	GOOD	Similar to Experiments in Science
EASY	EASY	GOOD	Two temperature probes, cable, graph software
EASY	EASY	BEST PRODUCT IN CLASS	Part of a multimedia curriculum ("Whales and Their Environment")

(201) 227-9283
List Price: $155 for robot kit and interface unit
Requires: Apple II Plus or IIe, 48K RAM, one 5¼-inch disk drive, 16-pin game port. DOS 3.3; not copy-protected; cannot use mouse.

CIRCLE 381 ON READER SERVICE CARD

Precision Timer II
Vernier Software
2920 SW 89th Street
Portland, OR 97225
(503) 297-5317
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive; game port; photogates ($35–$40 for kit). DOS 3.3; not copy-protected; cannot use mouse.

CIRCLE 382 ON READER SERVICE CARD

Cardiovascular Fitness Lab
HRM Software
175 Tompkins Avenue
Pleasantville, NY 10570
(800) 431-2050
List Price: $165
Requires: Apple II Plus or IIe, 48K RAM, one 5¼-inch disk drive, one open slot. DOS 3.3; not copy-protected; cannot work with mouse.

CIRCLE 383 ON READER SERVICE CARD

Experiments in Science
HRM Software
175 Tompkins Avenue
Pleasantville, NY 10570
(800) 431-2050
List Price: $259
Requires: Apple II Plus, IIe, or IIGS; 48K RAM; one 5¼-inch disk drive; 16-pin joystick port. DOS 3.3; not copy-protected; cannot work with mouse.

CIRCLE 384 ON READER SERVICE CARD

Experiments in Human Physiology
HRM Software
175 Tompkins Avenue
Pleasantville, NY 10570
(800) 431-2050
List Price: $259
Requires: Apple II Plus, IIe, or IIGS (some experiments can run on a IIc); 48K RAM; one 5¼-inch disk drive; 16-pin joystick port. DOS 3.3; not copy-protected; cannot work with mouse.

CIRCLE 385 ON READER SERVICE CARD

Temperature Grapher
HRM Software
175 Tompkins Avenue
Pleasantville, NY 10570
(800) 431-2050
List Price: $79
Requires: Apple II Plus or IIe, 48K RAM, DOS 3.3, one 5¼-inch disk drive, 16-pin joystick port. DOS 3.3; not copy-protected; cannot work with mouse.

CIRCLE 386 ON READER SERVICE CARD

Bank Street Laboratory
Holt, Rinehart and Winston
383 Madison Avenue
New York NY 10017
(212) 872-2206
List Price: $370.50 (quantity discount available to schools)
Requires: Apple II Plus or IIe, 64K RAM, one 5¼-inch disk drive, one open slot. DOS 3.3; not copy-protected; cannot work with mouse.

CIRCLE 387 ON READER SERVICE CARD

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Sideways Prodos & Dos 3.3 45.00
Roger Wagner Merlin ProDos 65.00
Merlin Assembler 42.00
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The Byte Works
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Koala Pad Plus w/Graphics Exhibitor	79.00
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The Cricket IIc	109.00
Rainbow Paper Pak *(300 Sheets)*	14.00
ImageWriter Ribbon-Black	4.50
ImageWriter Ribbon-Color	5.00
ImageWriter II - 4 Color Ribbon	12.00
ImageWriter Rainbow Pk. (6 Colors)	27.00

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5¼" Blank Diskettes	
BASF 5.25" SS/DD *(box of 10)*	8.50
Verbatim 5.25" SS/DD *(box of 10)*	10.00
Sony 5.25" SS/DD *(box of 10)*	9.00
Maxell 5.25" SS/DD *(box of 10)*	10.00
3M 5.25" SS/DD *(box of 10)*	12.00
3½" Blank Diskettes	
BASF 3.5" DS/DD *(box of 5)*	12.00
Bulk *(Sony)* 3½" DS/DD *(box of 10)*	19.00
Centech 3½" DS/DD Color Disks *(box of 10)*	23.00
Sony 3.5" DS/DD *(box of 10)*	23.00
Fuji 3.5" DS/DD *(box of 10)*	23.00
Maxell 3.5" DS/DD *(box of 10)*	23.00
Verbatim DS/DD *(box of 10)*	24.00
3M 3.5" DS/DD *(box of 10)*	25.00
C. Itoh 3.5" DS/DD Color Disks *(box of 10)*	26.00

Printers

Brother M-1109AP *ImageWriter Comp.*	259.00
M-1409 *(180cps Dot Matrix NLQ) 10"*	349.00
M-1509 *(180cps Dot Matrix NLQ) 15"*	389.00
HR-20 *(20cps)* Daisywheel	349.00
HR-35 *(35cps)* Daisywheel	729.00
TwinWriter 5	Call
Citizen	
MSP 120D *(120cps Dot Matrix 10")*	189.00
MSP 10 *(160cps Dot Matrix 10")*	289.00
MSP 20 *(200cps Dot Matrix 10")*	329.00
MSP 15 *(160cps Dot Matrix 15")*	389.00
MSP 25 *(200cps Dot Matrix 15")*	489.00
Premier 35 *(35cps Daisywheel 15")*	489.00
Epson LX-86	Call
FX-86e / FX-286e / LQ-800/1000 / EX-800/1000 / LQ-2500	Call For Most Recent Low! Low! Prices
Okidata Okimate 20 Color Printer	139.00
Microline 182P *(120cps Dot Matrix 10")*	249.00
Microline 192*Plus (200cps Dot Matrix 10")*	359.00
Microline 193*Plus (200cps Dot Matrix 15")*	529.00
Microline 292P *(240cps Dot Matrix 10")*	549.00
Microline 293P *(240cps Dot Matrix 15")*	689.00
Panasonic KXP-1080AP *(100 cps) ImageWriter Compatible*	249.00
KXP-1080i *(120 cps)* NLQ Mode	219.00
KXP-1091i *(160 cps)* NLQ Mode	269.00
KXP-1092i *(180 cps)* NLQ Mode	329.00
KXP-1592 *(160 cps)* NLQ Mode	419.00
KXP-1595 *(240 cps)* NLQ Mode	499.00
KXP-3131 *(16 cps)* Daisywheel	259.00
KXP-3151 *(23 cps)* Daisywheel	409.00
Star Micronics	
NX-10 *(120cps Dot Matrix/NLQ 10")*	229.00
NX-15 *(120cps Dot Matrix/NLQ 15")*	339.00
NP-10 *(100cps Dot Matrix/NLQ 10")*	189.00
NB24-15 *(216cps Dot Matrix/NLQ 15")*	689.00
NB-15 *(300cps Dot Matrix/NLQ 15")*	939.00
ND-15 *(180cps Dot Matrix/NLQ 15")*	529.00
NR-15 *(240cps Dot Matrix/NLQ 15")*	529.00

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PICK OF THE CROP
BY DENISE CARUSO AND LISA RALEIGH

Languages, travel, trucks, talking spreadsheets, and more for you and your Apple II

PRODUCT SPOTLIGHT

TML PASCAL

More than a few programmers will be delighted to know that TML Pascal, the popular development system for the Mac, is now running on the IIGS. An Apple Programmer's Workshop language with complete access to IIGS tools, TML Pascal can create standalone ProDOS 16 applications and shell applications, desk accessories, and definition procedures for building custom menus, windows, and controls.

Just a few features of the language are random I/O, generation of native 65816 code, code segmentation with no restriction on code size, Pascal strings and string operations, and direct Apple IIGS tool access. In addition, a TML Source Code Library documents and demonstrates the use of IIGS ROM tools. Its examples include demonstrations of sound, menus, QuickDraw color graphics, windows, desk accessories, and more. If you've been using the Macintosh version of TML Pascal, you'll find that that version has library resources to help you port programs to the IIGS.

A version of TML Pascal is also available in a stand-alone integrated, multiwindow, mouse-based form with "compile a window" capability.

VITAL STATISTICS
List Price: TML Pascal, $125; multiwindow version, $125; Source Code Library, $49; Pascal plus Source Code Library, $150
Requires: Apple IIGS; 768K RAM, 3.5-inch disk drive, APW version requires APW. ProDOS 16; not copy-protected; APW version does not work with mouse, but multiwindow version does.
TML Pascal
TML Systems
4241 Baymeadows Road
Suite 23
Jacksonville, FL 32217
(904) 636-8592
CIRCLE READER SERVICE NO. **410**

ADVENTURES ABROAD

Now boarding the latest flight of fancy for the armchair traveler . . . . Ticket to London and Ticket to Paris from Blue Lion software are cunning combinations of adventure and travelogue. You virtually go to these dreamy cities, muck around, learn the geography, and solve a problem or two along the way.

In the London version, you lose your return ticket (not such a bad deal, really), and the only way to get it back is to follow some bloke with a bowler hat around the city. If you eventually solve the puzzle, you've had a healthy dose of real-life London—complete with actual restaurants, pubs, museums, and stores and their actual opening and closing times.

In Paris, you're trying to find a lost cousin who prefers to be somewhat *mystérieux* and leaves highly ambiguous clues as to his whereabouts. As in London, you have to contend with the nitty-gritty realities of traveling abroad: navigating a street map of that singularly charming maze called Paris, dealing with the vagaries of fluctuating exchange rates, and figuring out how to order dinner in a foreign language and not get "Beaks of Baby Ducks in Mustard Sauce under Glass."

VITAL STATISTICS
List Price: $39.95
Requires: Apple IIe or IIc, 128K RAM, one 5¼-inch disk drive. Proprietary OS (modified DOS 3.3); copy-protected; does not work with mouse.
Ticket to London and **Ticket to Paris**
Blue Lion Software
P. O. Box 650
Belmont, MA 02178
(617) 489-2477
CIRCLE READER SERVICE NO. **411**

SQUEAKY CLEAN

Ever try to clean a mouse? It's not easy getting into all the nooks and crannies inside the mouse once you've popped out the rubber ball on which the mouse rolls around. Now there's the MouseCleaner 360° Kit. MouseCleaner comes with a little Velcro ball that you can roll around inside the

mouse. The kit also comes with cleaning fluid that you apply to the Velcro, plus a chamois cloth and a special pad that helps you remove the "scrubber ball."

List Price: $16.95
MouseCleaner 360° Kit
Ergotron, Inc.
P.O. Box 17013
Minneapolis, MN 55417
(800) 328-9839
(612) 854-9116

CIRCLE READER SERVICE NO. **412**

JUST SAY NO

Did you know that the ancient Greek word for drugs, *pharmakon*, was a word that meant both *poison* and *medicine*? That's one of the facts that Marshware is getting through to kids with its two-disk series Drugs: Their Effects on You and Drugs: Who's in Control. The software stimulates kids to think about both the good and bad uses of drugs, eliminating the black-and-white judgmentalism that turns off so many kids. It also draws them into simulated situations where they might need to make choices about drugs and helps them discover alternate behaviors that work.

Each disk comes with a *Teaching Guide* that includes instructions, a program overview, and a

dictionary to help teachers or community program organizers in planning its use.

VITAL STATISTICS
List Price: $49.95 each; $84 for both disks in set
Requires: Apple II Plus, IIe, IIc, or IIGS; 5¼-inch disk drive. DOS 3.3; copy-protected; does not work with mouse.
Drugs: Their Effects on You and **Drugs: Who's in Control**
Marshware
P. O. Box 8082
Shawnee Mission, KS 66208
(800) 821-3303

CIRCLE READER SERVICE NO. **413**

KEEP ON TRUCKIN'

If you believe that the difference between adults and children is the size of their toys, or if you're not certain which category you fit into, you can make sure you have the entire playing field covered with this toy truck from the Apple Collection catalog.

If you really want it but you're afraid your big friends will laugh at you, tell them you bought it because it "reminds you of America's industrial might yet is somehow aesthetically irresistible." That ought to get you off the hook while they try to figure out what that means.

List Price: $29
Toy truck
The Apple Collection
P. O. Box T
Gilroy, CA 95021-2249
(800) 345-2888

CIRCLE READER SERVICE NO. **414**

TIME-LIFE BOOKS

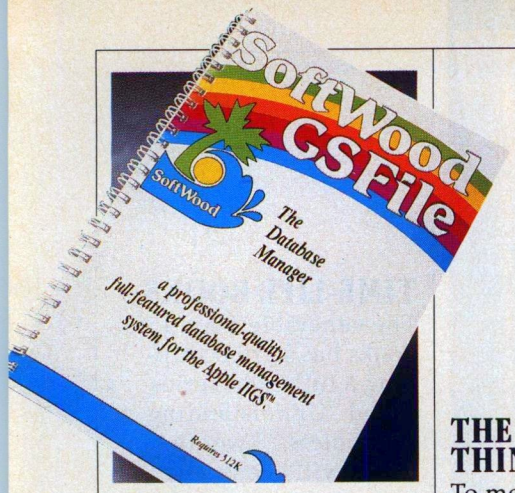
The venerable Time-Life Books has started shipping a full-color series called "Understanding Computers." Twenty books will eventually comprise the series, and nine of the titles are available today, including the introductory *Computer Basics*, followed by *Software*, *Computer Images*, *Input/Output*, *Computer Security*, *Artificial Intelligence*, *Computer Languages*, *Communications*, and *Robotics*.

You subscribe to the series and receive a book every other month. They say you keep only the books you want. Be sure to ask the details of the contract when you call.

List Price: $14.99—$18.99 in Canada—per book, plus shipping and handling; prices subject to change
Understanding Computers
Time-Life Books, Inc.
Time & Life Building
Chicago, IL 60672-2058
(800) 621-7026

CIRCLE READER SERVICE NO. **415**

PRODUCT SPOTLIGHT



FILE AWAY WITH ME

One of the promises of the Apple IIGS is that its graphics capabilities will inspire Macintosh-like applications. And sure enough, now you can get a file-management program called GS File that looks a great deal like a Mac program. It's got niceties such as scroll bars, pull-down menus, rubber-banding, and dialog boxes. These user-interface features make it easy for you to create up to eight field types, sort on multiple fields, perform simple calculations, and design entry screens and report formats. The company claims that you can import and export AppleWorks databases to and from GS File.

VITAL STATISTICS
List Price: $150
Requires: Apple IIGS, 512K RAM, 3.5-inch disk drive. ProDOS 16; not copy-protected; can work with mouse.
GS File
SoftWood Company
P.O. Box 2280
Santa Barbara, CA 93120
(805) 966-5884

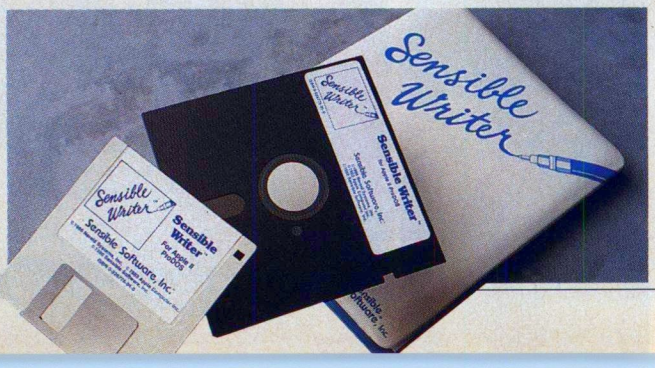
CIRCLE READER SERVICE NO. **416**

THE SENSIBLE THING TO DO

To mouse or not to mouse. That is the option Sensible Writer gives you. This word-processing package lets you either give keyboard commands or work with a mouse and allows you to display two documents simultaneously on your screen. Like Macintosh word-processing programs, it features pull-down menus, scroll bars, and formatting "rulers." It also allows you to see on the screen exactly what you will print out, including boldface, underlining, and page breaks. Sensible Writer is also able to read and write to AppleWorks word-processing files and comes with a built-in mail-merge capability.

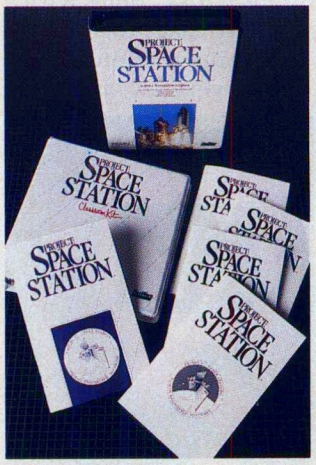
VITAL STATISTICS
List Price: $99.95
Requires: Apple IIe Enhanced, IIc, or IIGS; 128K RAM; 5¼- or 3.5-inch disk drive. ProDOS 8; not copy-protected; AppleMouse recommended.
Sensible Writer
Sensible Software, Inc.
210 South Woodward
Suite 229
Birmingham, MI 48011
(313) 258-5566

CIRCLE READER SERVICE NO. **417**



GOING INTO ORBIT

Fly a space shuttle. Build a space station. Deploy satellites for fun and profit. Conduct research-and-development efforts. Learn about project management while having fun and learning about space exploration and the scientific method. That's the point of Project Space Station, an educational



program intended for use in grades 7 through 12. The product comes in a single-user version or a teachers' kit with six disks and six sets of documentation, plus worksheets and study guides.

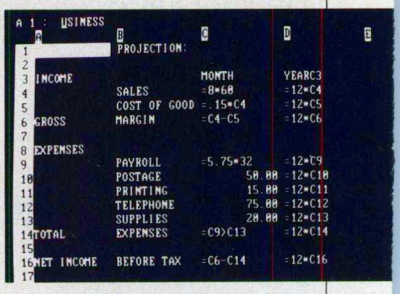
VITAL STATISTICS
List Price: single-user version, $34.95; classroom kit, $119.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; 5¼-inch disk drive. Proprietary OS; copy-protected; does not work with mouse.
Project Space Station
HESWare
390 Swift Avenue, #14
San Francisco, CA 94080
(415) 871-0570

CIRCLE READER SERVICE NO. **418**

RAP IT TO ME

Rapsheet—what else would you call a spreadsheet that talks? Talking software like this is a boon to the visually-impaired, who might find computers otherwise inaccessible. Modeled after Lotus 1-2-3, Rapsheet can serve as a regular spreadsheet, or you can use it with a voice synthesizer (the Echo synthesizer) so that it speaks aloud everything that you type at the keyboard. It can read back, too.

Computer Aids Corporation once sold Rapsheet as shareware, but now it has enhanced it and is supporting it. Paid shareware users can send in their disks and get $35 credit toward the upgrade, which has a capac-



ity of 2112 cells.

VITAL STATISTICS
List Price: $65
Requires: Apple IIe or IIc, 64K RAM, 80-column card, one 5¼-inch disk drive. DOS 3.3; not copy-protected; does not work with mouse.
Rapsheet
Computer Aids Corp.
124 W. Washington Blvd.
Suite 220
Fort Wayne, IN 46802
(800) 647-TALK

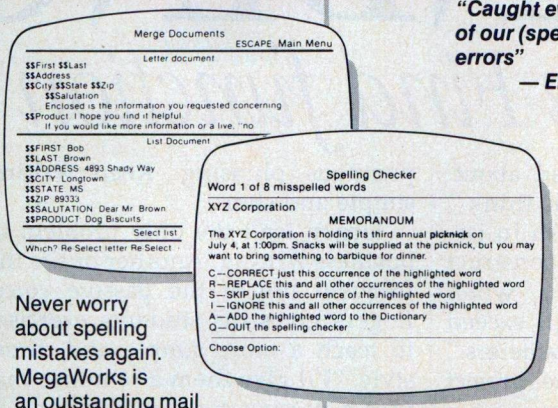
CIRCLE READER SERVICE NO. **419**

LIMITED TIME OFFER

Complete AppleWorks at a Price that Works

Over 400,000 Apple Users already know AppleWorks is a powerful program — but you need it to do more! With Megahaus products you can do mail-merging, spelling correction, enhanced report generation, and outline organizing, operating with the same commands and visuals as AppleWorks.

MegaWorks $49.95

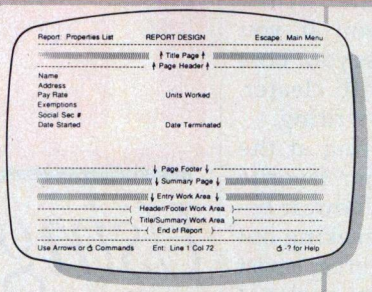


"Caught every one of our (spelling) errors"
— Electronic Learning

Never worry about spelling mistakes again. MegaWorks is an outstanding mail merge and spelling correction program designed exclusively for use with AppleWorks. The merge facility lets you combine database information with word processing documents creating personalized form letters. The 40,000 word dictionary checks your document for misspellings and corrects them as you view them in context.

- ▲ CREATE personalized form letters using lists from your AppleWorks word processor and database files.
- ▲ PRESERVE the original format of the document after merging.
- ▲ CHANGE merged documents with AppleWorks by saving them on disk.
- ▲ ACCESS all AppleWorks printing options.
- ▲ CHECK for misspelled words & add up to 10,000 new words.

ReportWorks $49.95



"ReportWorks is the most important AppleWorks add-on available." ***— A+***

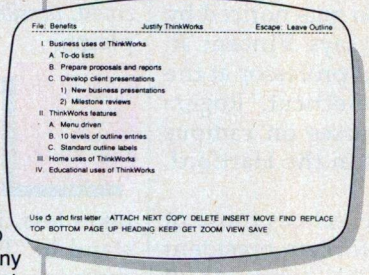
Making decisions is easy with the right information. ReportWorks adds powerful new report generation capabilities to AppleWorks, creating reports, tables, lists and full-page forms from existing AppleWorks database and spreadsheet files. It performs all calculations, such as adding taxes, adjusting discounts, looking up prices and totaling invoices. And, it provides the ability to repeatedly sort, search and select the information to be included in the report.

- ▲ POWERFUL free-form design features for creating reports and forms.
- ▲ INTEGRATION of data from several different files in one report.
- ▲ SORTING of reports (up to 3 levels) after they're created.
- ▲ AUTOMATIC pagination, dating, and running totals.
- ▲ MORE math functions than AppleWorks alone.
- ▲ ADDITION of headers, footers, title & summary pages, etc.

System Requirements: Apple IIe (enhanced), IIc (128K min), IIgs; Two disk drives recommended for ReportWorks and ThinkWorks; Optional: most hard disks, RAM cards, UniDisk 3.5

ThinkWorks $49.95

"A well-made outline processor. . ." ***— A+***



Good planning means success, so ThinkWorks is a must for those reaching for the top. This easy-to-use outlining tool enables you to efficiently organize nearly any type of information — for business, home or school. Outlines can be expanded, rearranged, and merged with familiar AppleWorks commands. Use it by itself or as a powerful add-on tool.

- ▲ ZOOM to view outlines at any level of detail.
- ▲ CREATE outlines with up to 10 levels of detail.
- ▲ AUTOMATICALLY wrap words within paragraphs.
- ▲ MERGE all or part of one outline into another.
- ▲ EXPORT into AppleWorks to create documents.

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WORD PROCESSING
BY JACK McGARVEY

FINDING
Using the Find function

Your word-processing program's Find function can make you a better writer. It can help you if you want to impress your boss (or your subordinates) with clearer, simpler, and more direct writing.

Using Find is like sitting at the computer screen with your favorite English teacher at your elbow. It becomes a pointing finger, seeking out uses of jargon, passive verbs, sexist language, and your own personal writing faults. Once you've found them, you can quickly delete, insert, and revise whole passages. More diligent writers can even use Find to change long sentences into shorter ones.

It can help you, that is, if you feel the need to improve your writing. If you like the creative contributions the computer industry has made to the English language with new words such as *networking, keyboarding, inputting, outputting, architecting,* and *modeming,* then perhaps you should read no further. If those kinds of convolutions turn you off, however, then you are ready to use Find to write simpler prose.

Use your word-processing program's full power to manipulate your own words.

The use of such new words is creative, no doubt about it. But it is jargon, and the problem with jargon is that it takes more and more words to make your meaning clear.

Here's an example from a memorandum written by a middle-level manager to his boss in a large insurance company: "Pursuant to our communication and subsequent conversations, could you kindly peruse this draft of the enclosed document and output your assessment at your earliest convenience?" It is stiff and formal, and it is 25 words long, which is the average length of the typical business sentence.

That memo could have been written in 14 easy, informal words: "I've written up what we talked about. Please let me know what you think."

Business writing is awash in jargon. Inventive managers construct alibis and rationalizations when they write "the project will exceed the specified time parameters." Translated, that says, "The project will be late."

Words such as *now, then,* and *when* become "at this point in time," "at that point in time," and "at what point in time." A project that is just about finished becomes a "project in the end stages of finalization," and those who are working at it "are finalizing" the project.

Although jargon is common in business, "it is the clear writer who gets noticed by top management," says Vincent R. Rogers, a writer and professor at the University of Connecticut. Rogers teaches writing courses on campus and at corporations in the Hartford, Connecticut, area.

Rogers' comment echoes those of Richard Deupree, former president of Proctor and Gamble, who said, "I don't understand complicated problems. I only understand simple ones."

Keep It Short and Simple

Deupree valued clarity, especially in writing. Proctor and Gamble constantly reminds its executives and managers to sharpen their writing skills. No overblown jargon, no pompous phrasing. Keep writing simple and short.

Jargon isn't the only problem in business writing. Another one is the frequent use of the passive voice. Rogers gives his students exercises to teach a more simple and direct style. "I'll give them a sentence that uses a passive construction such as 'It is recommended that we develop a program to increase sales in Indiana.' We'll discuss ways to make the statement more active and usually arrive at a sentence like this one: 'We recommend that we sell more policies in Indiana.' Passive writing "simply does not carry a clear message," Rogers says.

Some of the reasons businesspeople write like this are psychological. "Executives are fearful of committing themselves on paper. They use obfuscation like a turtle's shell. They hedge their predictions with *might, could, possibly,* and *seems,*" Rogers explains.

Writing simply and in a short, informal, and direct style takes less time than using business jargon, Rogers adds. It also takes less time for readers to understand it. "But it is not easy to wean someone away from jargon—it is amazing how ingrained writing this way has become—but it is worth the effort."

Junking Jargon

If you'd like to try weaning yourself away from jargon and passive writing, the Find function is perfect for finding them quickly. After you've finished a memorandum to

FAULTS

to improve your writing

your boss, all you have to do is call up Find and spend a little time checking what you've written to see if it contains any of the faults Rogers mentions.

Here is how to use Find to write better:

• Use Find to eliminate jargon. Program Find to locate all occurrences of *-ize* and *-izing*, those popular suffixes that beget such confections as *maximize* and *formalizing*. You can develop a list containing such -ize words as *actualize* (make real, gain, reach); *hypothesize* (assume, suppose); and *utilize* (use) and substitute the simpler words for them. You can also develop a list of verbose phrases such as *at this point in time* (now); *in as much as* (because, since); *prior to* (before); *take cognizance of* (see, recognize); and the too frequently used *with regard to* (about). Make another list of pompous words such as *attain* (reach); *expedient* (useful); *herewith* (with this); *mitigate* (ease, soften); and *subsequent* (later) and substitute regular words in their place.

• Use Find to eliminate passive writing. Ask Find to locate uses of *is, was, are,* and *were*. When Find stops at any of them, rewrite the sentence with sharp detail and good, strong verbs. For example, "It is recommended by the committee to take a firm stand" becomes "The committee recommends a firm stand." The second sentence is better, no question about it.

• Use Find to locate your personal writing faults. Every writer has them. Redundancies such as using both *also* and *as well* are common. To locate a redundancy, type in the half you use most often. Using *perhaps* too often or using a cliché such as *has a tendency to* might be others. Just read back over something you've written, and a writing fault will fall out. Guaranteed.

If you'd like to wean yourself away from jargon and passive writing, the Find function is perfect.

• Use Find to locate conditional language. Type in *could* (as in "I could see the possibility of . . ."), *would* (as in "I would think"), *believe* (as in "I believe" when you mean "I think"), and the ubiquitous *seems* and *appears* (as in "it seems to me . . ." or "it appears that . . ."). If you want to hedge, keep these words in. At least Find will tell you how often you are waffling.

• Use Find to eliminate sexist language. Program Find to look for *man* or *men*, and the pronouns *she, her, hers,* and *he, him,* and *his*. Having Find locate a *she* in a use such as "The salesmen said the consumer . . . she . . ." avoids offending millions of men who see themselves also as consumers. Using sexist language inevitably hurts; everyone has a stake in avoiding stereotyping.

• Use Find to reconstruct long sentences into shorter, more powerful ones. Program Find to look for commas as a way to analyze sentence structure. Commas are a key, especially when the sentence is overly long. Carefully analyze each comma and break some sentences into two or more shorter ones. Experts recommend sentence length averaging about 15 words, not the lengthy 25-word average currently in vogue.

• Use Find to check for misuse of homophones. Find can locate homophones or other frequently confused words that your spelling checker may overlook. Program Find to locate *to* and *too*, which are among the most frequently confused words. When Find appears, type *to*. Others that good writers use correctly are *brake–break, capital–capitol, coarse–course, desert–dessert, farther–further, hear–here, its–it's, lead–led, passed–past, principal–principle, quiet–quite, shone–shown, stationary–stationery, than–then,* and *their–there–they're*.

• Use Find to see if you have used apostrophes too much. Make sure you haven't put one into a verb, like this: *see's*.

Using Find helps you become a better writer because your own writing on the screen looks like a page out of a book. This appearance brings objectivity and a cool detachment that is impossible to achieve when you're doing a messy paper-and-pencil draft. Use your word-processing program's full power to manipulate your own words to seek the better verb, the sharper detail, and the more apt phrase.

The Find function can keep your attention where it belongs, on your own words, as you revise and proofread. As Vincent Rogers says, "You learn to write well by revising and revising again. That's where you discover how powerful simple, clear, and direct writing can be." ✚

Jack McGarvey is a free-lance writer in Sandy Hook, Connecticut, who teaches writing to middle-school students and adults.

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Over the past several months CDA has offered a number of ready-to-run Apple IIGS systems. We tried to design the perfect system to meet the average users needs, however, each customer's needs are unique. The most common question on the order lines was, "I like your prices but can I get it with...?" The answer is YES! BUILD YOUR OWN SYSTEM. Tailor it to meet your own specific needs.

*And remember when you buy from CDA you buy with confidence. If your not 100% satisfied with your purchase, we will refund your purchase price, no questions asked! *software excluded

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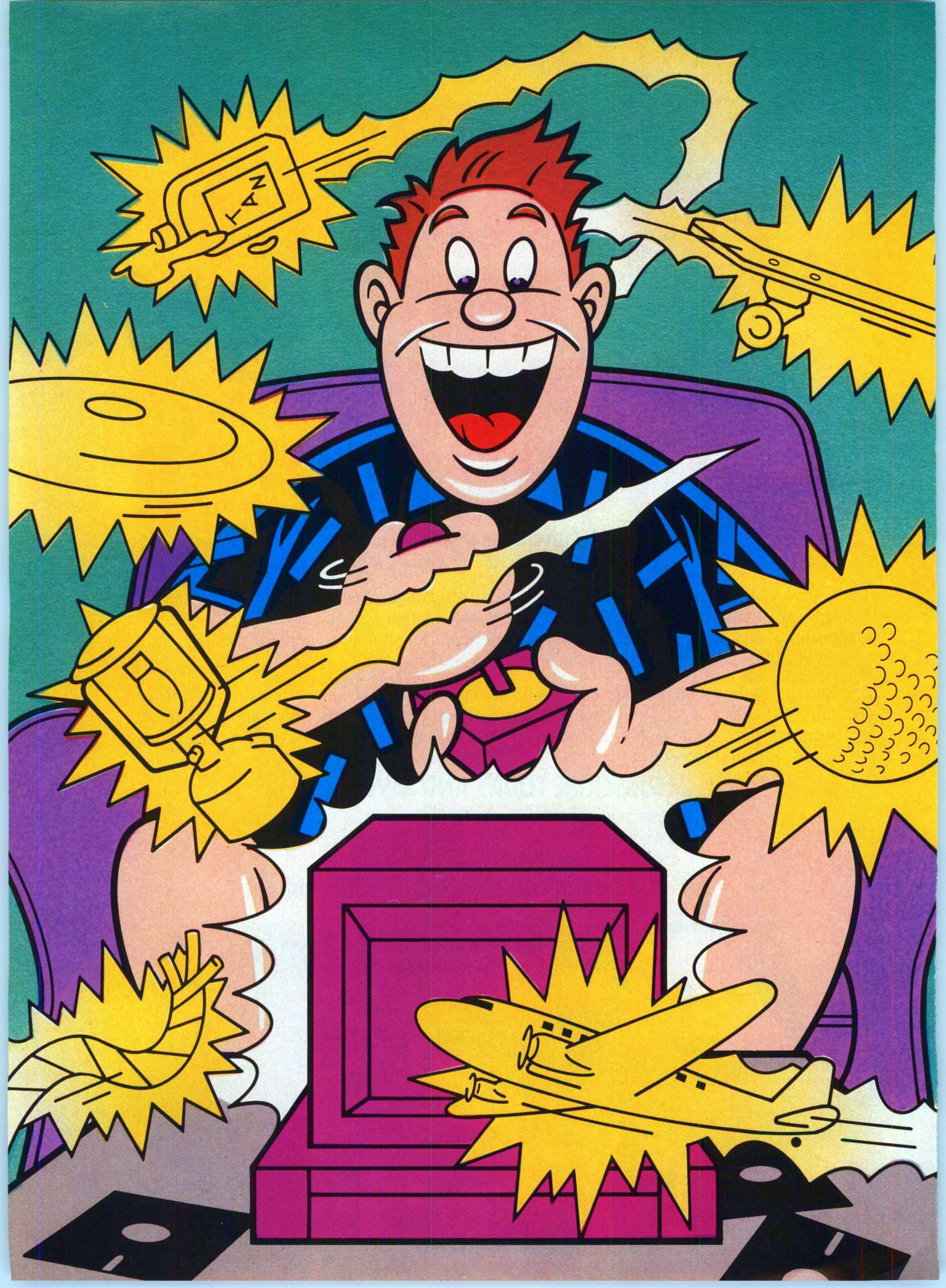


Simulate your way through those strenuous leisure activities.

A Couch POTATO'S Guide to SUMMER FUN

Summertime, summertime, sum-sum-summertime. It's the best time of year. Hot days, warm nights. Surfing, boating, camping, golfing. Cutoffs and bathing suits. Girls on the beach. Soft drinks and barbecues.

Sunburn and mosquito bites. Aching muscles and sand in your teeth. Fast-food meals. Weeding. Mowing the lawn. Long, claustrophobic rides in the family car.

Who needs it?

Simple logic indicates that there's something wrong here. For nine long, lovely, vegetating months, you work to perfect your best couch-potato technique. The fingers become nimble from constant channel changing. The eyes grow strong and the mind blissfully weak from reading junk novels. You spend innumerable hours indenting the living-room sofa.

Then, for three hyperactive months, your friends and family expect you to throw it all away. And why? So you can get in shape, show off your tan, and brag about the wonderful time you've been having in The Great Outdoors.

It's enough to put a couch potato off his Twinkies.

There is another way. If you are a computer-owning couch potato (sometimes known as a computato) or if you happen to be a gung-ho individual who wants to enjoy summer activities all year 'round, your computer can simulate the active fun of summer without forcing you to stray strenuously from the comforts of monitors and keyboards. Hiking, sailing, golfing, biking—it can all happen on your computer monitor and in your imagination.

Equip yourself with a Hawaiian shirt, shorts, a little self-tanning lotion, the right software, and a convincing story. No one will know that you were never more than 20 paces from the refrigerator.

Mother Nature on a Diskette

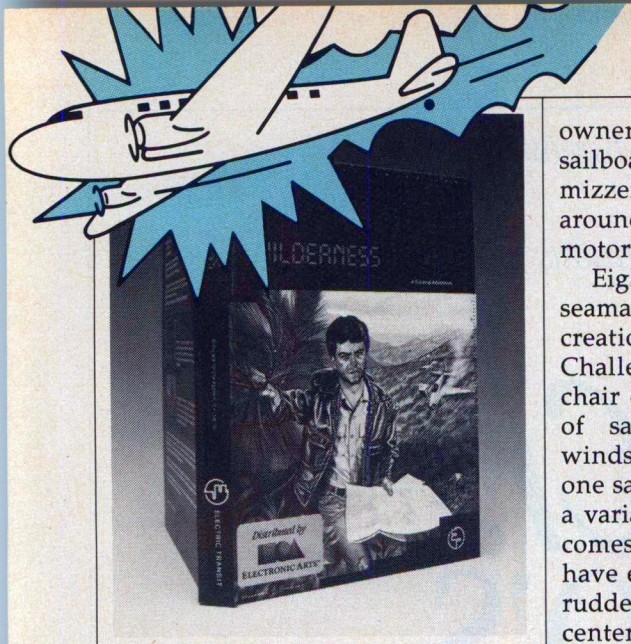
Camping is the ultimate outdoor adventure. Load the four-wheel drive and take off for a weekend.

How much easier it is to load the disk drive and boot up for the evening. A few moments of data transfer and Electric Transit's Wilderness for the Apple II series has transported you to snow-capped mountains or steamy jungles.

Wilderness allows daring couch potatoes to indulge in real-life role playing. You have crashed your plane deep in the boonies or assumed the role of an archaeologist in quest of a lost city. You must defy weather, geography, ferocious beasts, and your own human frailties in order to survive. It's brutally realistic and as challenging as any demon-slaying fantasy.

Computato survivalists start out by filling their backpacks with the appropriate items. Folks who have been camping in front of the TV for nine months will have to attend to more than packing soft drinks and cheese dip to come through Wilderness unscathed.

ILLUSTRATION BY RON CHAN



Hills can be tough to negotiate without climbing gear. One false step and you can break a leg. Bring enough supplies, or you'll have to forage for nuts and berries. Taste before you eat, or a bad berry may take poisonous revenge. This simulated trek is full of authentic outdoor dangers.

The graphic centerpiece of Wilderness is its simulated three-dimensional landscape. You can get your bearings by studying the compass and a topological map of the area. Then you switch to a camper's-eye view of the surroundings—trees and rivers, hills and wolves. Glance randomly around this illustrated wilderness or command the computer to pan, and the countryside visibly scrolls past as if you were slowly turning your gaze.

Wilderness comes with one ready-made map of the Sierra Nevadas to explore. When you've mastered this prefab region, Wilderness generates an entirely new map in one of ten levels of difficulty. Map creation can take up to three hours, a nice chance to renew acquaintance with the couch and rest up for the next journey.

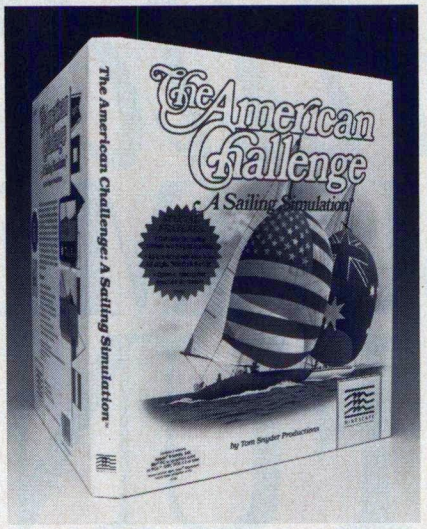
Would-be world travelers can acquire the five Global Explorer disks, which include wildernesses of Bolivia, British Columbia, Burma, Chile, and New Guinea. Just don't try to convince the Monday morning office gang that you went on a weekend jaunt to Southeast Asia. They won't buy it.

Batten the Keyboard

They might buy a weekend on the waves, though. The American Challenge: A Sailing Simulation from Mindscape gets Apple II owners into a little competitive sailboating. Or, if you don't know a mizzen from a mainsail, just putt around the computer harbor in a motorboat.

Eight courses await your expert seamanship in this simplified recreation of sailing. The American Challenge doesn't befuddle comfy-chair captains with a wide variety of sails or constantly shifting winds. This simulation has only one sail that is either in or out and a variable-speed wind that always comes from the north. Still, you'll have enough to do controlling the rudder, raising and lowering the centerboard, avoiding collisions with opponents, and making the most of a friendly current.

An on-screen instrument panel indicates wind speed, boat speed, compass heading, race time, and

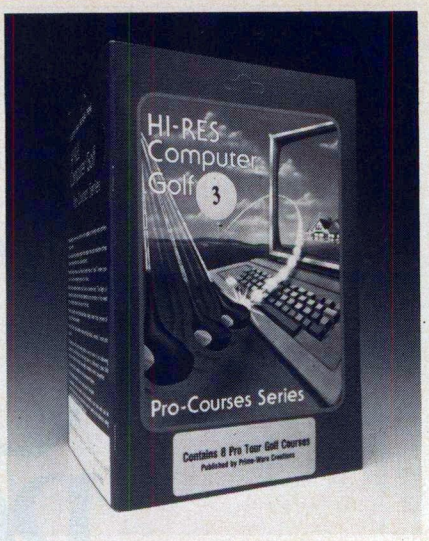


the position of your sails and centerboard. Above the instrument panel, a line drawing shows the sailboat in your choice of several viewpoints.

You can race against the computer, but lonely computer Popeyes don't have to sail in solitary waters. A modem option in The American Challenge allows players to compete over telephone lines or with two computers connected by a special cable. Having a friend to corroborate your sailing experiences adds tremendous credence to summertime deception.

Fairways, the Easy Way

Golfing—even the real thing—rates as the ideal couch-potato sport. It looks like exercise. It sounds like exercise. But how much muscle tone can you develop rolling over the grass in an electric-powered cart? Tell the buddies



that you shot nine holes this afternoon, and even the most skeptical will believe you were on the links grabbing your ration of summer gusto.

Golf simulations tend to share the basics of the duffer's favorite sport. Select your clubs. Aim the shot. Gauge the power of your mighty arms. Hope for the best. These simulations tend to differ in the way they display the course and allow you to execute the mechanics of the swing.

Stuart Aronoff's Hi-Res Computer Golf III, now available from Prime-Ware Creations, has been a classic since the early days of Apple II games. This recent version boasts eight built-in courses.

Blocks of solid color provide an abstract-art view of the course. Green geometric shapes represent trees, red locates sand traps and roughs, and blue depicts water. During the swing, you press a keyboard letter up to nine times to guide the club head through a swing path of horizontal lines. A swift finger and a keen sense of timing will help you hit the ball squarely, avoiding any hook or slice.

It won't win any prizes for graphic realism, but Hi-Res Computer Golf III does imitate the sense of timing and physical precision that it takes to play real golf.

World-Class Golf Graphics

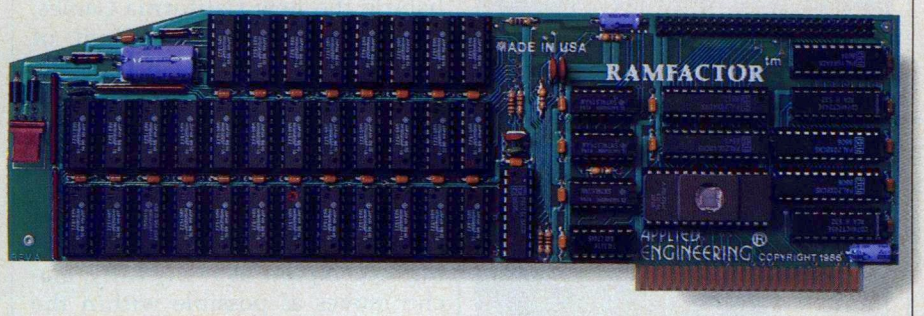
World Class Leader Board Golf from Access Software, Inc., is a modern golf classic recently converted to work on the Apple II family. When the guys press you to describe the courses, no problem—you just tell them about shady trees, meandering streams, threat-

RamFactor™

Boot any II+, IIe, or IIGS and be up and running your favorite software in less than 1 second.

Now anyone with an Apple II+, Franklin, Laser 128, Apple IIe or IIGS preferring to use slots 1 through 7 can now enjoy the speed and performance that they've been waiting for.

With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 MEG on the main board and an expansion connector can address an additional 16 MEG of memory for possible future expansion. Since virtually all software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger data bases, and expanded spreadsheets. And with the battery back-up option, you can switch on your Apple and your favorite software will be up and running in less than 1 second!



Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, MouseWrite, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other slot 1-7 memory card is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of records in the database and lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load all of AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 5¼", 3½", and hard disks. All this performance is available on the Apple II+, IIe, Franklin, or Laser 128 when used with an 80 column display. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

The "Instant On" Apple.

With the RamCharger battery backup option, RamFactor will retain programs and data during power failures or even when you turn your computer off. And because RamFactor plugs into slots 1-7, it's the only memory card that can cold boot an Apple without using slow floppy or hard disks. An available "Y" cable allows one RamCharger to power two RamFactors.

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With RamFactor, you can organize memory into multiple work areas and switch between them. Each work area can contain different programs and even different operating systems. Now you can switch from one program to another or even switch from AppleWorks to DOS 3.3 to CP/M to Pascal to ProDos in under a second. And with our battery back-up option, you can have permanent storage for up to 20 years.

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- Fully socketed and user upgradeable
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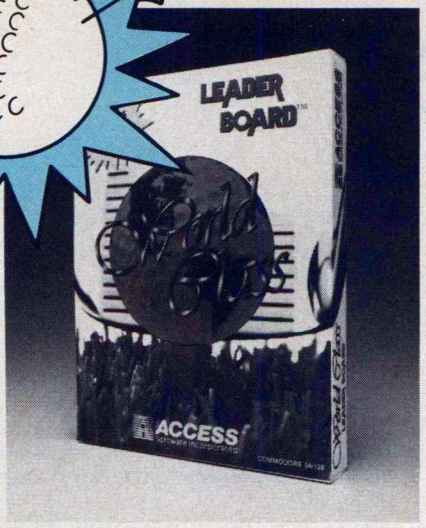


ening sand traps, and manicured greens. Leader Board gives you both a schematic overhead perspective of each hole and a stunning 3-D view of the course from a vantage point just above and behind the golfer.

From that location, you'll be able to appreciate the physical perfection of your fluidly animated swing. Power and snap meters on the screen help calculate force and timing. Hit the fire button to begin the stroke. Hit it again when the power indicator has risen to the proper level. Hit once more, precisely, as the lighted bar passes the wrist-snap line. Accurate timing here guarantees a drive straight down the fairway. The ball arches gracefully into the distance, and you're well on your way to the Bob Hope Classic, a legend in your own mind.

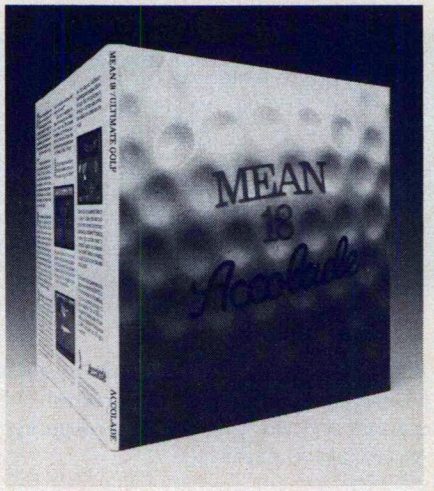
Leader Board putting requires the aid of a pole sticking out of the green. The direction and length of the shadow the pole casts indicate the incline of the ground. Compensate in your aim to account for the lay of the land, and you'll regularly be sinking those 52-footers.

Three simulations of world-famous courses come in the World Class Leader Board package: St. Andrews in Scotland, Champions Cypress Creek in Texas, and Florida's Doral Country Club. The programmers at Access have also created their own course, a challenging 18 holes called the Gauntlet Country Club. A course editor allows you to recombine existing holes into a customized course.

Create a Course You Can Beat

With Accolade's Mean 18 for the Apple IIGS, sofa spuds can construct their own courses, down to the last detail of shrubs and clubhouse. Or you can recreate the local course and compare scores with your buddies who are really out there wandering the fairways in their white pants and Arnold Palmer sweaters. You can use a course-architect toolkit to design a map of each hole, and the program automatically realizes it in full-dimensional realism.

Mean 18 offers players four ready-made courses: simulations of St. Andrews, Pebble Beach, and Augusta National, as well as Accolade's fictional Bush Hill Country Club. Like Leader Board, Mean 18 provides a golfer's eye view of the course and controls swings with a rising and falling power/snap bar. Putting takes place from an overhead perspective.



Accolade simulates the surroundings in slightly more detail, however. You can, for example, glance around the course, getting a full 360-degree gander at the layout. Greens, too, are more intricate, with a mixed bag of breaks and inclines between you and the hole.

For rec-room duffers who've blown their bucks on cheese puffs, taco chips, and diet soda, Thunder Mountain has published the bargain-priced Maxi Golf. With abstract graphics, yet all the play elements of golf accounted for, Maxi Golf is a good way to do a quick 18 holes for less than $10.

The Temple of Summer

Camping, sailing, golfing—all are outstanding warm-weather activities and the kind of thing you can enjoy in your own hometown or home computer. But to experience the ultimate in summertime

mindset, California here we come. Hooray for Hollywood, the land of brown bodies and blond brains.

Couch potatoes with beach blanket bingo on their minds owe a debt of gratitude to Epyx for publishing the new California Games, a freewheeling compendium of Southern California diversions. Take your choice of the fun, fun, fun that Golden Staters take for granted.

Half-Pipe Skateboarding has you wheeling through a cement trough, soaring left and right, trying to complete as many nifty, macho moves as possible within the time limit.

BMX Bicycle Race is a fast-pedaling excursion through the city and out to the beach. Pull wheelies, swerve and jump over road ruts, avoid open manhole covers, and bear down on an occasional foolhardy pedestrian.

Roller Skating proves that if God didn't want man to roll he never would have invented Venice Beach. Enjoy the ocean view while you cruise four sidewalk courses dodging beach balls, grass, and sand.

Computatos may need a breather after a round of Frisbee Toss. You control both the thrower and catcher. First, eye an on-screen gauge to time the windup and release. Then bend that joystick to get the receiver into position for his world-renowned behind-the-back or under-the-leg catches.

A computer simulation is a wonderful way to play Hacky Sack. In the privacy of your computer room, no decent person will see you crazily bopping a little leather bag off your feet, knees, chest, and head.

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Even if you aren't an expert in software set-up, you'll find our walk-through installation directions and full technical support will get you up and running on RAMUP™ — ESS *in minutes.* Then, if you still aren't completely satisfied, *we'll give you your money back in the first 30 days after delivery.* We'll also guarantee our products to be defect free — *if anything goes wrong in the first five years of use, we'll send you a replacement free of charge.* Call right now, toll free 1-800-443-6697 to order your RAMUP™ program or ESS Package.

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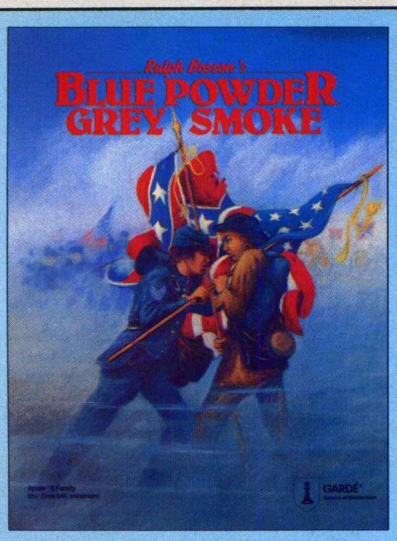

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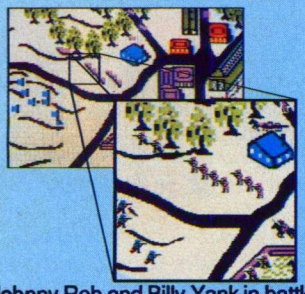

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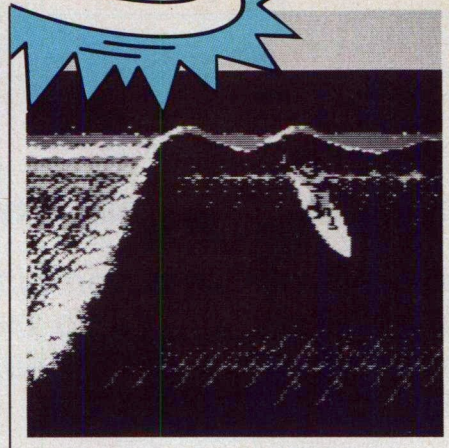

A screen from California Games' Surfing segment

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Bob Lindstrom is an A+ contributing editor and author of our monthly "GamePort" column.

PRODUCT INFORMATION

Wilderness with **Global Explorer scenery disks**
Spectrum Holobyte
(a division of Sphere, Inc.)
2061 Challenger Drive
Alameda, CA 94501
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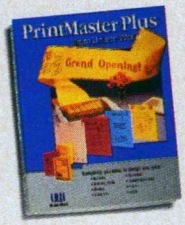

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IIGS UPDATE

Turn on and tune in your IIGS: Here's hardware and software ready for the job.

Super Sounds

HARDWARE *BY ROB SWIGART*

SuperSonic Cards from MDIdeas

The past few years have seen personal computers turn into tools for composing, editing, and playing synthesized music. Because the Apple IIGS harbors the most powerful sound hardware of any personal computer, with its Ensoniq Digital Oscillator Chip and special RAM, it should be the most potent tool for manipulating, rearranging, storing, and retrieving musical information (not to mention speech or sound effects—or, in fact, any old noise), but even its abilities can be enhanced. Now two new products from MDIdeas, the SuperSonic Multi-Channel Digitized Stereo Card and the SuperSonic Digitizer, can increase the Apple IIGS's musical power.

Although both products work together, you must purchase them separately. Each comes ready to install and includes a demo program. The one caveat is that the digitizer does not work without the stereo card, so you must purchase the stereo card first.

Stereo

Installation of the stereo card is easy. The rudimentary documentation is adequate to the task, since all you have to do is line the card up with slot 2, point the gold connectors down, feed the connectors through the hole in the back of your computer, and plug the card in. The only difficulty comes if you are going to use amplified speakers (such as the Bose Roommates). In this case, you must shift two jumpers on a pair of shorting blocks. This task is also trivial, though, since all it entails is pulling a small plastic plug off the left two pins and pushing it back onto the right two pins.

The function of the stereo card is pretty straightforward. It allows you to play through amplified speakers, unamplified speakers (I used a set of small Aiwas), or through a stereo amplifier. Three wires from the board end in left and right RCA plugs (the kind on most consumer electronic devices),

(Continued on following page)

SOFTWARE *BY STEVE MANN*

Music Construction Set & The Music Studio

Just in case you had any doubts, allow me to set the record straight—mice do not make the best musical instruments. With the first crop of music programs for the IIGS, you essentially have to point and click on each note. If you're fluent on any musical instrument, it's obvious how laborious that can be. If you just want to have some fun or learn the basics of music, however, a mouse lets you progress as fast as you'll be able to anyway, so you won't have any real problem.

Music Construction Set from Electronic Arts and The Music Studio from Activision are point-and-click music-composition programs. I can't tout them for professional musicians, but I can recommend them for dabblers or beginning music students. The programs are similar, but The Music Studio has

(Continued on following page)

PHOTOGRAPHY BY CARTER DOW

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  - *Bit operations*
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  - *Random access I/O*
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  - *4 real types (uses SANE)*
  - *UNIV and STATIC parameters*
  - *Full Code and Data segmentation*
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SuperSonic Cards from MDIdeas

(Continued from page 60)

and one wire ends in a stereo mini-plug that I have connected to my Aiwas.

The package includes a Music Construction Set Player Demo disk containing songs that show off the Music Construction Set user interface and sound capabilities. Music Construction Set does work with the stereo card.

You can start the MCS demo, stop it, and watch the notes march across the screen as the song plays, but you cannot adjust the volume or speed. The instruments appear to be limited in range and scope, but the stereo separation is impressive, and when more software that works with the stereo card appears, it will be an extremely useful addition to the Apple IIGS sound system for those interested in serious consumer sound.

The Music Studio from Activision also works with the stereo card—you can set your instruments to play through either the right or left channel. MDIdeas claims that more music software that will use the stereo card is coming from Brøderbund, Great Wave Software, and others besides Electronic Arts and Activision.

Digitized Sound

The SuperSonic Digitizer is as easy to install as the stereo card. In fact, it installs onto the stereo card and so does not take up another precious slot. Again, installation is easy: You slide the card onto the fingers at the back of the stereo card. This card has an RCA jack on it for input from a stereo, CD player, or tape deck. Although you can use a microphone, the line level is too low for effective sound.

The digitizer samples the sounds coming in, at the rate of 32,000 samples per second, meaning that for monophonic sound the IIGS uses up 32K of memory per second of sound. Therefore, you will need at least one megabyte of memory to use the digitizer.

Once the digitizer is installed, you must go to the Control Panel (by pressing Control-Option-Escape) and set slot 2 to look for "my card." Otherwise, the digitizer will play back already sampled sounds but won't record audio to memory.

Next you must turn off your IIGS and restart it in order to get the slot set properly. After restarting the computer and before replacing the computer's lid, you must adjust the volume. A horizontal line on the screen jumps in time to the music. You can set the volume by turning a small dial on the card until the waveforms touch the top and bottom of the screen.

The demo program that comes with the digitizer allows you to input music (or any recorded sound) into memory, play back the music in memory, save the memory contents to a disk, and load the computer's memory from a disk. It also allows you to record stereo sounds (although in a somewhat cumbersome fashion) by loading first one channel and then the other and setting the delay so the two channels begin playing together. You use the final menu option, Change Configurations. You can also simulate a stereo effect by using the start delays to create reverberation on playback. Change Configurations also allows you to adjust the volume and the frequency (pitch and playback speed).

The only problem I encountered with the digitizer card was one of frequency: Everything I recorded sounded like Donald Duck. I resolved this problem by setting the system speed to "fast." The software could have done so automatically, but it didn't, nor did the documentation explain that this step was necessary.

MDIdeas provides technical support for those with problems, either by phone (a toll call) or by mail, and a one-year warranty. Since these two cards together cost only $100, Apple IIGS owners will find a good bargain for their money. The digitizer in particular provides a good value in fun. Also, developers will be able to use these cards to incorporate sampled sounds into their programs (although at 32K per second, the overhead in memory is high). ✚

Rob Swigart is a Redwood City, California, author and software designer.

PRODUCT INFORMATION

SuperSonic Multi-Channel Digitized Stereo Card and **SuperSonic Digitizer**
MDIdeas
1163 Triton Drive
Foster City, CA 94404
(415) 573-0580

List Price: SuperSonic Multi-Channel Digitized Stereo Card, $59.95; SuperSonic Digitizer, $39.95

Requires: Apple IIGS; Digitizer requires 1 megabyte of memory

CIRCLE 370 ON READER SERVICE CARD

Music Construction Set & The Music Studio

(Continued from page 60)

more features than does Music Construction Set and is more suited for those who want to learn about sound "construction" as well as music fundamentals.

Music Construction Set

When you start Music Construction Set (MCS), it plays one of the demonstration pieces on the program disk. Once you stop the tune by clicking the mouse, a blank music staff appears at the top of the display, and a "parts box" appears at the bottom (see figure 1, next page). To create a piece of music, you click on something (such as a note) in the parts box, drag it to the music staff, and click again, placing the note on the staff. In a nutshell, that's how you write music with Music Construction Set.

The parts box includes notes; rests; sharps; flats; ties; and octave extenders, which let you move a composition up or down an octave. The program also has controls that let you change the piece's speed and the volume levels for the upper and lower halves of the staff.

You move from measure to measure within your piece by using the scroll bar underneath the staff. A click on one of the two directional arrows moves the piece over roughly one note, and a click in the scroll bar moves it about a measure (holding down the mouse button repeats these actions). You can also click and drag the "active measure" indicator to position yourself any-

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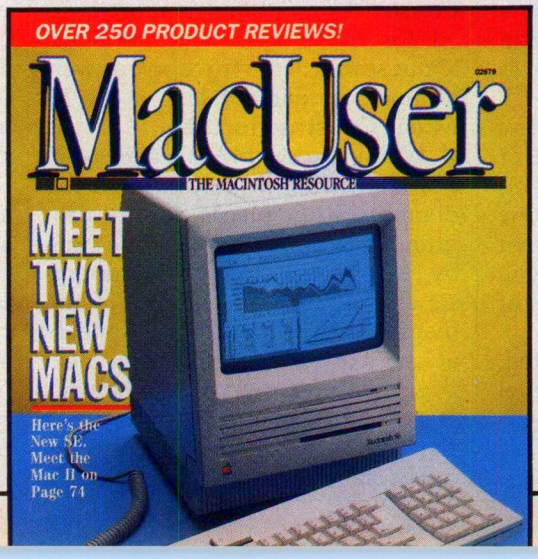

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where within your composition.

There is also a set of editing commands, patterned after those of Macintosh programs, that let you make block changes to your tune. You can select a block of notes, from either half of the staff or both halves, and cut, copy, paste, and/or clear that block. Block changes simplify building larger compositions from already created measures.

When it's time to play your masterwork, you first assign instruments to the top and bottom halves of the staff (see figure 2) by selecting two commands on another pull-down menu (you can use the same voice for both staffs). Then select the Play command.

MCS comes with several sample pieces, which are generally quite good. It also includes nine prepro-

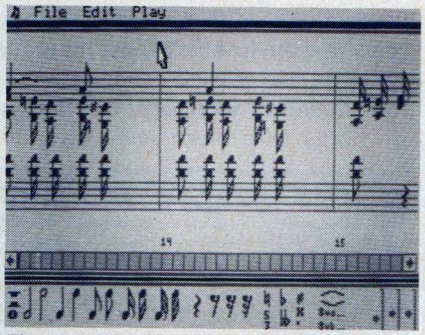

Figure 1: To compose a tune with Music Construction Set, you drag notes from the "parts box" at the bottom of the screen to the staff. The parts box also contains rests, sharps, flats, ties, and octave extenders.

grammed voices, each with approximately a six-octave range—more than enough for most purposes. The eight standard time signatures cover most timing possibilities. Most MCS commands have command-key shortcuts, and the program has commands for transposing a whole section of a piece up or down. You can print a score of the current piece on an ImageWriter. You can also connect MCS to a Mac-compatible MIDI controller, through the GS's modem port, and play your composition on a MIDI device or input MIDI commands to MCS. You cannot store MIDI-input pieces in a song file, however.

MCS is not an overly ambitious music-composition program. It has a lot of good basic features that make it suitable for music students and occasional music hackers, though. It uses high-resolution

MCS *Has a Lot of Good Basic Features That Make It Suitable for Music Students.*

graphics on the display screen and on the ImageWriter. The printed scores look good, but the mouse tracking is a bit rough. Selecting a block of notes is tough, because the program has a tendency to keep scrolling and selecting unless the mouse is *perfectly* still.

MCS could benefit from a few refinements. For instance, it gives you no easy way to select a large block of notes. You have to click and drag to select a block. Scrolling can be slow, so it can take several seconds to select any block longer than a few measures. Deleting notes is complicated. You have to click a note and then drag it down to the parts box and click again, or click the note and then press the backspace key. Either way, too many actions are involved.

Also, if you copy a block to another location, it overlays the notes currently there unless you include

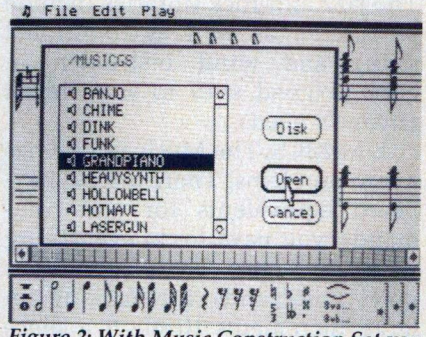

Figure 2: With Music Construction Set you can choose one instrument to play the bass half and another to play the treble half.

a measure bar as part of the pasted block (in which case it moves everything down). If you mistakenly overlay some notes, there's no way to undo that mistake—you have to clear out each pasted note one by one, which is a big pain.

The Music Studio

At first glance, The Music Studio (TMS) looks somewhat like MCS—a big double-staff occupies the middle of the screen. Instead of having a parts box, however, the program has a variety of pull-down and pop-up menus that are scattered around the periphery. The File menu is for loading and saving pieces and sounds, and the Options menu offers a variety of odds and ends (see figure 3). In addition, several menus pop out of icons when you click on them—menus for selecting note duration, block operations, rest durations, time signature, and so on. These menus are roughly the equivalent of the MCS parts box, only a bit more clever.

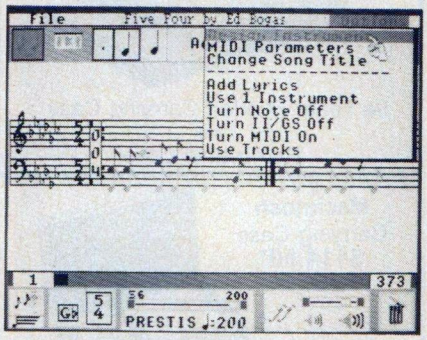

Figure 3: The Music Studio has an Options menu that includes MIDI parameters and an option that lets you type in lyrics.

One unique feature of The Music Studio is its "music paintbox" that lets you "doodle" without worrying about formal notation. The features that really distinguish the two programs, however, are primarily on the Options menu. A key difference is the Design Instrument option on The Music Studio, which has no equivalent on MCS. When you select this option, a display appears that shows the sound characteristics of the current instrument. With this display, you can control the attack, decay, sustain, and release characteristics of an instrument (for an explanation of these terms, see "Sound Basics" in the March 1987 issue of *A+*), and set vibrato, stereo-channel assignment, octave range, and note length (see figure 4). This display gives you a lot of freedom to change the characteristics of any of the 64 supplied instruments to create your own sounds.

The second important feature is MIDI parameters. Although TMS requires a special MIDI controller board to use these features and can only *output* information to a MIDI device, you can control channel assignment, voice presets, and octave ranges for up to 15 instruments,

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Overall, Creating a Piece Is Easier and Quicker with The Music Studio.

which gives you a lot of flexibility.

Two other features that you control from the Options menu are worth mentioning: First, you can enter up to three lines of lyrics in a song. The lyrics print out on the score (as with MCS, you can print out a song or song fragment on an ImageWriter). Second, a feature called Tracks lets you assign individual instruments to up to four separate tracks and work with one track or more at a time. The Tracks feature lets you layer multiple instruments on the same note of the staff.

Finally, the biggest difference between the two programs is that you can use up to 15 separate instruments in a Music Studio piece, with each instrument represented by a different color on the staff. Activision supplies 4 sets of 15 instruments for you: jazz, rock, classical, and a set of sampled human voices. The jazz and rock libraries include percussion as well as traditional string and wind instruments—enough good stuff to suit almost anyone's needs.

Like MCS, The Music Studio has a few problems. There are no keyboard equivalents for any commands; you have to do everything with the mouse. The program has good commands for moving in large increments through a piece but is a bit weak for fine scrolling control—the opposite of MCS. The dialog box for loading and saving pieces and sound libraries is just plain weird. It's just the opposite of what you'd expect from a mouse-based interface. With this dialog box, you choose a function and then select an object, which contradicts the usual order, selecting an object first and then the action that applies to it.

The mouse operations for changing volume and note duration on the Design Instrument panel are awkward—the program doesn't redraw the screen as you change parameters, until you pause. It's tough to figure out what's going on at first. Also, the program is slow at times, particularly when redrawing the grand staff.

Just the Two of Us

Both of these programs have strong and weak points. Music Construction Set's major strength is its simplicity; it's easy to learn and use. When you compare it to The Music Studio, that's also its biggest weakness. Feature for feature, TMS is a superior product with a lot more flexibility. Both products need better documentation, particularly The Music Studio, which has certain features that just aren't explained clearly. Neither manual has an index.

Both programs could use some work on their user interface. They require you to stack simultaneous notes on top of each other, and neither makes any attempt to visually fit notes into their measures according to their time values (a what-you-see-is-what-you-get feature for music software). Overall, because of the mouse operations you use to move notes around, creating a piece is easier and quicker with The Music Studio.

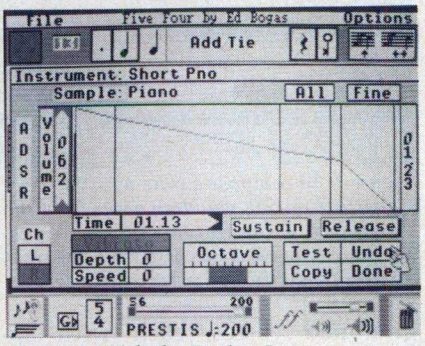

Figure 4: With the Design Instrument option in The Music Studio, you can control the sound characteristics of any instrument you select.

Both products can play up to 15 notes at a time, more than enough for most people (unless you *really* start layering instruments with The Music Studio). This capability is a function of the IIGS's sound hardware more than anything. They both can handle moderate-length tunes: 3000 notes for TMS (which requires 512K RAM), 300 measures for Music Construction Set (which runs on a 256K IIGS). They can play in stereo with an ap-

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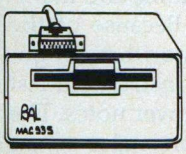

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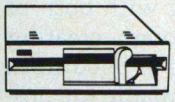

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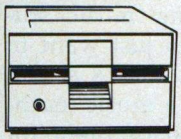

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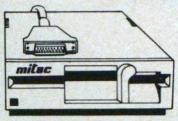

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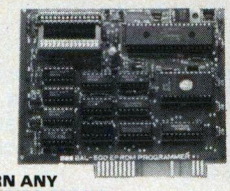

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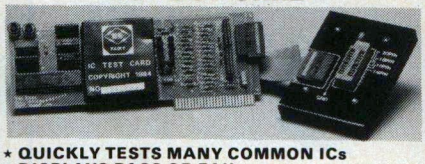

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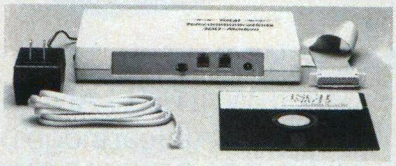

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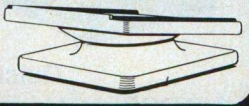

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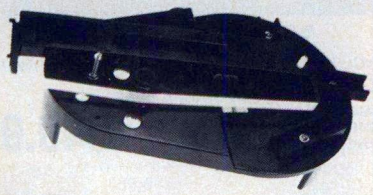

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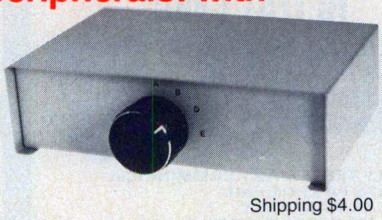

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propriate plug-in card, such as MDIdeas' SuperSonic stereo card (see accompanying article).

Both programs have some good instruments and some bad ones. The MCS piano is particularly good, whereas TMS's strings sound good. Undoubtedly, additional sounds will be available for both products in the future.

Finally, each program has some particular problems attributable to the way it uses the IIGS's sound hardware. Creating long, sustained notes is almost impossible, because of the way the IIGS stores and manipulates waveforms. Because of the sound-generation algorithms, higher notes for a single instrument last a shorter time than lower notes. The low-frequency response also seems to be weak, even through a good-quality stereo system.

Coda

I enjoyed working with both of these products, although creating music with a mouse is laborious. Neither of them is suitable for professional musicians, except as an experimental toy, but both are well suited for beginning music students and folks who just want to play around with the IIGS sound hardware. If I were a music teacher, I'd consider both of them for classroom use. +

Steve Mann, a former professional musician, is a San Francisco writer whose specialty is personal-finance software.

PRODUCT INFORMATION

Music Construction Set for the IIGS
Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
(415) 571-7171
List Price: $49.95
Requires: Apple IIGS, 256K RAM, 3.5-inch disk drive, mouse. ProDOS; copy-protected.

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IIGS UPDATE

BY RON LICHTY AND TOM CROSLEY

Learn about IIGS programming in our exclusive report

Making the IIGS Sales DEMO

PART II

In last month's issue, we presented Ron Lichty and Tom Crosley's first-person account of the programming effort that went into the IIGS sales demo. This month we bring you several annotated examples of the assembly code that comprises the demo, as an illustration of the possibilities of the IIGS.

SHADOW PLAY

As soon as it is time to show a new frame of animation, the Shadow routine in figure 1 is called for every object that has changed on the screen, either because the object was just drawn or because it was erased. Each object is described by the rectangle that encloses it: The global variable length has the width, in pixels; height has the number of scan lines; and vbaddr is the byte offset into the video screen buffer of the upper left corner of the rectangle.

Although the 65816 mvn instruction is faster than a tight loop with just a single lda/sta pair, an "unfolded" loop is even faster because it spreads the loop overhead across several instruction cycles. The trick is in managing to have one unfolded loop, regardless of the rectangle's size. Our solution was to compute an indirect address into the middle of the loop and then execute the loop, drawing or erasing right to left, once for each line being shadowed. Since four pixels are updated for every 16-bit lda/sta, a maximum of 80 lda/sta pairs is necessary for the 320 × 200 graphics mode we used in the demo.

OVERLAP DISSOLVE

The data-bank register (B) has previously been set to bank 1, to allow 2-byte-operand access both to shadow screen memory (vbuffer) and to the table of random addresses (DissolveTbl, which we located at $A000 in bank 1)—see figure 2. The random address table, generated during the initial load, randomly mixes the addresses 0–1023, and the addresses of the 32 bytes comprising the first palette have been evenly spread through the table. The current picture is, of course, already on the screen. The picture to which we're dissolving may be anywhere in memory; its 24-bit address has been stored to the direct-page location LongIndirect. Shadowing has been enabled, so that each byte appears on the real screen as it is written to the shadowed screen.

After all that setup, the code for doing the lap dissolve is rather simple. The X index register is loaded with an index to the last entry in the random table and, in the outer loop, is decremented through all random table values. Because indirect long indexing requires the Y register, it is used in the inner loop to hold the random picture location, which is initially loaded from the random table indexed by X. The accumulator must switch between 8-bit and 16-bit in order to, at one point, move a picture byte and, at another, add 1024 to an address.

The routine works for switching both pixels (two at a time as bytes) and palette bytes, because of the inner-loop comparison with screen-

FIGURE 1: SHADOW PLAY

```
maxpixels       equ 320                 ; max number of pixels
                                        ; horizontally
vbuffer         equ $012000             ; location of super-hires
                                        ; buffer in bank 1
; shadow a rectangle defined by length, height, and vbaddr
 Shadow         anop
; compute: offset into the loop = ((maxpixels/4)-n) * 6, where
; n = ((length-1)/4)+1     (= # of words, rounded up)
                lda length              ; # of horizontal pixels
                dec a                   ; - 1
                lsr a
                lsr a                   ; /4
                inc a                   ; + 1
                sta temp
                lda #(maxpixels/4)      ; 80
                sec
                sbc temp                ; 80 - n
                asl a                   ; * 2
                sta temp
                asl a                   ; * 4
                clc
                adc temp                ; * 6 (each lda/sta pair
;                                         requires 6 bytes)
                adc #loop               ; add beginning of loop
                sta >loopaddr           ; save in bank 0 variable for
;                                         indirect jump
                ldx vbaddr              ; get starting vbuffer offset
                ldy height              ; and # of scan lines
                phb
                pea $0101               ; switch to data bank 1
                plb
                plb
toloop          jmp (loopaddr)          ; jump into loop
loop            lda !vbuffer+158,x      ; shadow the last four pixels,
;                                         causing
                sta !vbuffer+158,x      ; video buffer in bank $E1 to
;                                         be updated
                lda !vbuffer+156,x
                sta !vbuffer+156,x
                        •               ; (76 lda/sta pairs not shown)
                        •
                        •
                lda !vbuffer+2,x
                sta !vbuffer+2,x
                lda !vbuffer+0,x        ; shadow first four pixels
                sta !vbuffer+0,x
                txa
                clc
                adc #(maxpixels/2)      ; increment to next scan line
                tax
                dey                     ; decrement scan line counter
                beq done                ; all done
                jmp toloop              ; otherwise back for more
done            plb                     ; restore data bank reg
                rts
```

FIGURE 2: OVERLAP DISSOLVE

```
                ldx #(1024*2)+(32*2)-2  ; last table entry index
GetRandomLoop   ldy !DissolveTbl,x      ; get one table entry
StoreOne        sep #$20                ; switch to byte access
                longa off
                lda [LongIndirect],y    ; get byte from new pic
                sta !vbuffer,y          ; store to screen
                rep #$20
                longa on                ; sw back to double
;                                         byte access
                tya                     ; increment random table
                clc                     ; entry to index into next
                adc #1024               ; 1024-byte screen area
                tay
                cpy #scrnbytes          ; still on screen?
                blt StoreOne            ; if so, loop to store
;                                         another else done with
;                                         this random table entry
                dex                     ; decrement table index
                dex                     ; to previous entry
                bpl GetRandomLoop       ; and loop (last index
;                                         is 0) unless done
```

bytes (a constant value of 32,000). In the case of pixels, first a pair of pixels is moved within the first 1024 bytes on the screen, then 1024 is added, and the pair of pixels in the same relative location further down the screen is moved, and so on until the index points beyond screen memory. In the case of the palette bytes, while the index is already beyond screen memory, it executes once, moving the palette byte from the new picture into the screen's palette, before the comparison is made.

In the demo itself, a variable-length delay in the inner loop, which is executed for every byte moved, lets us set the speed of the dissolve.

SOUND PARAMETERS

SoundParam0 is one of two parameter blocks that guide the sound tools (see figure 3). It instructs the tools to grab sound from the $70-page ($7000-byte) sound buffer, starting at location 0 in bank $B, and to play 22,000 bytes of sound per second (wave_freq is a code, rather than the value 22,000). It also instructs the sound tools to allocate two $800-byte (2K) buffers in DOC (Digital Oscillator Chip) RAM and initially fill both from bank $B before starting to play. As one of the two DOC-RAM buffers empties, the Ensoniq switches to play from the other and issues an interrupt, giving control to the sound tools to load the empty buffer with the next available $800 bytes.

When the sound tools have grabbed all $7000 bytes at $B0000, they look to the location at label AfterWave0 to determine if another parameter block immediately follows: In this case, SoundParam0 points to SoundParam1.

SoundParam1 differs in that its sound buffer starts at $7000 in bank $B and that its next-parameter block points back to SoundParam0. All other parameters are the same.

The two $7000-byte buffers in bank $B hold only enough sound to play about 2½ seconds. So while the sound tools grab $800 bytes at a time under interrupt control, our demo program regularly checks the IIGS's heartbeat clock to determine when to uncompress another $2000 (8K) bytes of sound into the bank $B "play" buffers.

RUNNING THE DEMO USING ONE 800K DRIVE

When the Apple people asked us to write the Apple IIGS dealer demo, they specified that each dealer would have the same hardware configuration: two 800K drives, one megabyte of RAM, and an analog RGB monitor. We wrote the demo for this setup.

The Apple folks also asked us to include a pause feature so they could preload the beginning of the demo for showing on a big screen at a dealer show in Florida, and later in Cupertino.

After the demo was out in the stores for a while, we realized that almost all of the first disk (/SD1) loaded into RAM before the pause, and after you pressed Return, it accessed /SD1 only once more. Thus, the pause feature could be used for running the demo on a single disk drive, even though that was not our original intent.

Virtually everything in the directory /SD1/BIN/ loads into RAM at the beginning; then the SCENECONTROL file loads, directing the program to /SD2/ACT1/SC1. The first scene loads, but then the program needs to load a font. (The text is kept separate from the graphics, which allowed translation of the demo into several foreign languages, complete with special characters as needed.) The program references /SD1/BIN one last time, to load the file GS.FONT.P.

So, all that is necessary to get the program to run on one disk drive is to move the font file from /SD1 to /SD2 (the second disk drive) and patch the program to avoid changing the prefix temporarily back to /SD1/BIN:

1. Using the System Utilities (or equivalent), copy the file:

```
cp9,10/SD1/BIN/GS.FONT.P to
/SD2/ACT1/SC1/GS.FONT.P
```

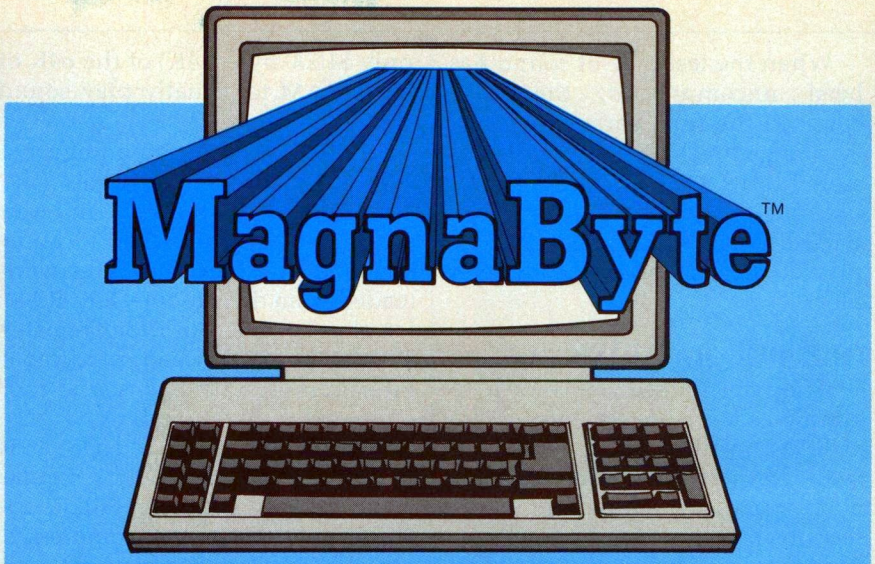
2. Boot /SD1 and break into BASIC using Control-C. Then

```
LOAD STARTUP
21 POKE 28191,156
SAVE STARTUP
```

This changes an STA into an STZ, which leaves the prefix as is, so the font file loads from /SD2/ACT1/SC1.

3. Hold down the open-apple key while typing RUN to load the configuration program. Choose a number for the volume (e.g., 2), answer R for "rolling demo" and Y to the Pause prompt.

4. After the code and initial data files have loaded (about 80 seconds), replace the /SD1 disk with /SD2 and press Return. The demo will now run continuously from the second disk only.



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When the last byte of sound has been uncompressed, the page count in the final parameter block is changed from $70, and a 0 is stored to its AfterWave location to indicate that no parameter block will follow it, which will terminate play at the end of that parameter block.

OUR DOC RAMDISK

After the last-minute switch to sampled sound, the extra megabyte of RAM on the plug-in card filled fast. Desperately searching for more spaces for squirreling away sections of compressed speech, we suddenly realized we were using only $1000 bytes (4K) of the 64K of DOC RAM to actually play sound from.

We wrote the routine in figure 4 to move a section of bytes (the number of bytes is in the accumulator) from the location PackedLoc, where the bytes were loaded from disk, to the DOC RAM location specified in index register Y. We found we had to disable interrupts around the sound-tool write-to-DOC-RAM call.

To play the compressed speech, it must first be moved into regular RAM with the inverse call_ReadRamBlock and then uncompressed into the "play" buffer (figure 3).

FIGURE 3: SOUND PARAMETERS

```
; Parameter block definitions for _FFStartSound

SoundParam0     anop                ; wave 0 parameter block
Waveform0Start  dc  i4'$B0000'      ; sound "play" buffer location
Wave0Size       dc  i2'$70'         ; # of pages to play
;                                     ($7000 bytes)
                dc  i2'wave_freq'   ; DOC freq. register:22 khz.
                dc  i2'$F000'       ; DOC-RAM sound buffer location
                dc  i2'Buff_size'   ; code: DOC-RAM sound
;                                     buffer size
AfterWave0      dc  i4'SoundParam1' ; Next: other parameter block
                dc  i2'Volume'      ; DOC volume setting
```

FIGURE 4: OUR DOC RAM DISK

```
; move Accumulator bytes @ PackedLoc to location Y in DOC RAM
MoveToCard      ENTRY
                php
                sei                 ; disable interrupts

                PushPtr PackedLoc   ; source address
                phy                 ; location in DOC ram
;                                     to move to
                pha                 ; # of bytes to move
                _WriteRamBlock      ; move RAM bytes to DOC ram

                plp                 ; reenable interrupts
                rts
```

FIGURE 5: IN CHARACTER

```
ChkKbd          anop                ; returns carry set if
;                                     a key has been pressed
                pushword #0         ; make room for result
                pushword #$ffff     ; event mask
                pushptr EvtRec      ; ptr to data packet
                _GetNextEvent       ; call EM and check the
;                                     event queue
                pla                 ; ignore function result
;                                     for this example
                lda EvtRec          ; check event code
                cmp #3              ; key down?
                beq gotone          ; yes
                cmp #5              ; autokey (repeated key)?
                beq gotone          ; yes
                clc                 ; report no char
                rts
gotone          lda EvtMods         ; look at modifiers
                and #$100           ; Open-Apple key?
                beq regchar         ; no, branch with acc = 0
                lda #$80            ; yes, set bit 7 of acc
regchar         ora EvtMsg          ; merge with char
                sec                 ; say we have a char
                rts

EvtRec          ds 2                ; event code here
EvtMsg          ds 4                ; char found here
EvtWhen         ds 4                ; timestamp
EvtWhere        ds 4                ; mouse position
EvtMods         ds 2                ; key modifiers go here
```

Unlike with a RAMdisk, however, the exact location in DOC RAM must be specified, and there are no flags and no memory manager to prevent two programs from storing bytes to the same DOC RAM location. For the sales demo, a single program that uses all of memory itself, however, the DOC RAM provided vital storage space.

IN CHARACTER

With the earlier Apple II's, getting a character from the keyboard was as simple as checking if the most significant bit of location $C000 was set; if so, it contained the character in the lower seven bits. You could then write any value to location $C010 to reset the hardware for the next character.

For compatibility with earlier Apple IIs, this technique still works on the IIGS, but only if you are not using the Event Manager (EM). When the EM is in use, it can "steal" characters from the keyboard buffer out from under your program, so it is risky to rely on checking location $C000.

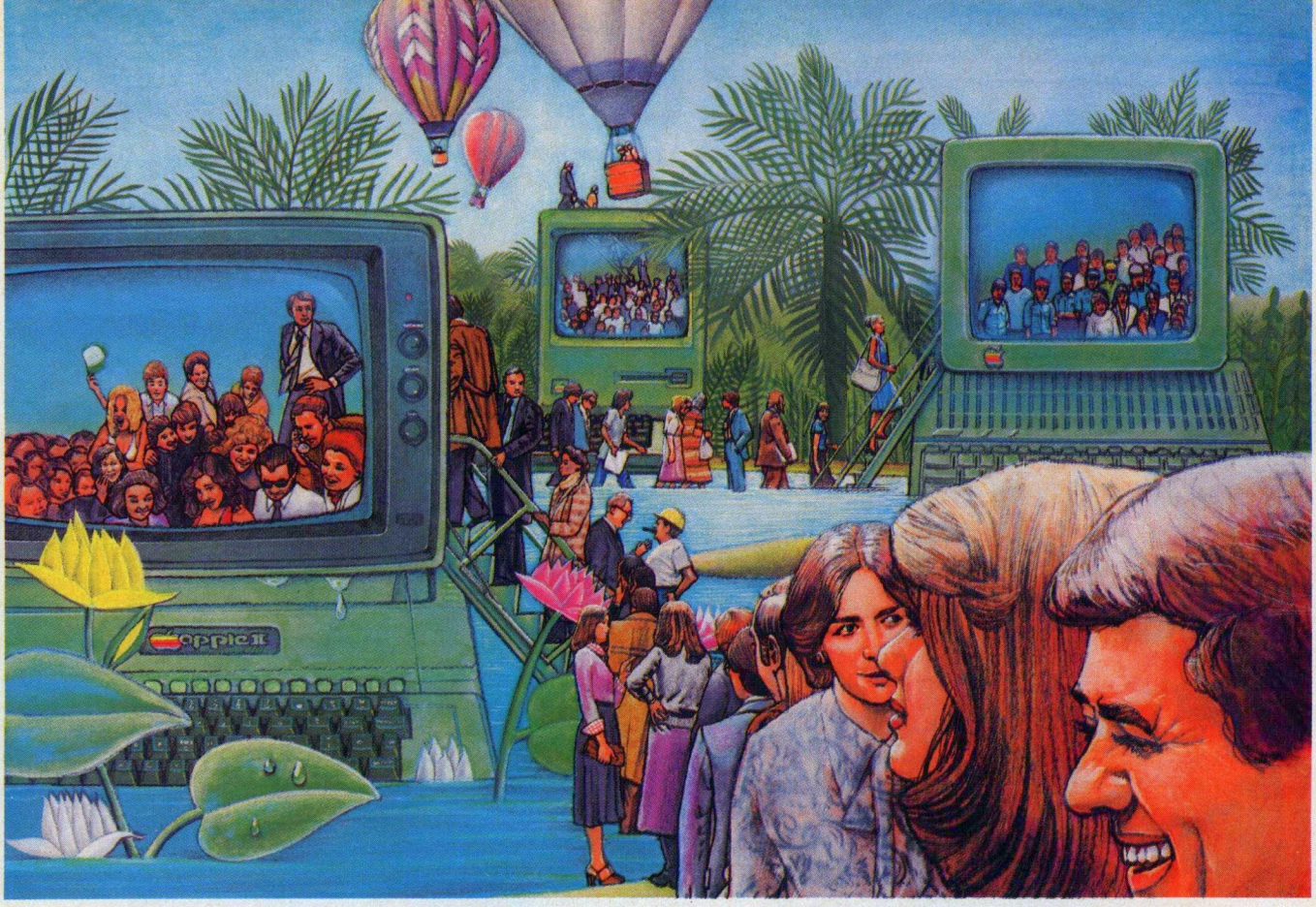
The subroutine ChkKbd in figure 5 checks for a keyboard character being pressed and ignores all other events. The carry flag is set if a character is returned; the character itself is in the accumulator. If the open-apple key is down, bit 7 ($80) of the returned character is set. The Event Manager automatically handles type-ahead and auto-repeated keys.

To wait for a keyboard character, use

```
loop jsr ChkKbd
     bcc loop ;branch if no char yet
```

In the code in figure 5, note that every time GetNextEvent is called, the current mouse position is also updated in the event record. (Mouse clicks are reported as separate events). ✚

Apple chose Ron Lichty and Tom Crosley, of Softwest, to program the IIGS sales demo because of their knowledge of the IIGS's 65816 microprocessor. Both had participated in software-design critiques of the 65816 in the previous two years, and Lichty had just finished reviewing the galleys for his book Programming the 65816 with his coauthor, David Eyes, for Brady Books.



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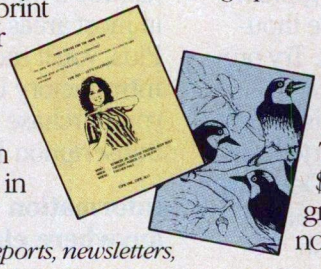

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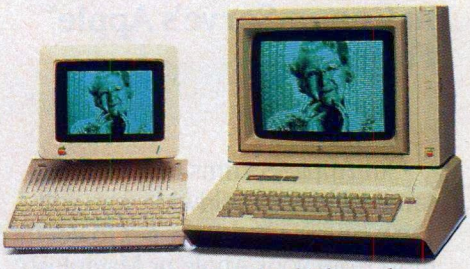

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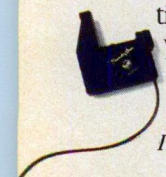

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FEATURE REPORT
MULTICOLUMN FORMATTING FOR NEWSLETTERS

SHORT REPORT
ENCYCLOPEDIC POWER

A+ APPLEWORKS REPORT

This month's 'Feature Report' takes you beyond the formatting limitations of the word-processing module, and the 'Short Report' introduces an encyclopedia program called FactWorks.

FEATURE REPORT *BY CHARLES RUBIN*

MULTICOLUMN FORMATTING

All the commotion going on about desktop publishing these days can leave users of the AppleWorks word-processing module aching for some extra formatting power. After you have seen all those elegant multicolumn reports and newsletters featured in articles about desktop publishing, the single-column format of AppleWorks can look a little boring.

Although AppleWorks alone won't give you the graphics manipulation or headline-formatting capabilities of a publishing program such as Springboard Software's The Newsroom, you can use AppleWorks' data-interchange facilities to reformat word-processing text into multiple columns for simple newsletter formats. The procedure involves entering and editing text in the word-processing module and then transferring it to the spreadsheet module via the database module. The row/column layout of a spreadsheet is ideally suited to multicolumn formatting and printing.

Finalizing and Fitting Copy

The first step in preparing any document is to finalize the contents. Enter and edit your text until you are completely happy with it and consider formatting only when you have laid your editing urge to rest. This preliminary step is particularly important with text destined for a multicolumn format, since you have only limited editing abilities once you've transferred your text to the spreadsheet module. The only text you don't have to worry about at this stage is the newsletter's banner, or title and publication information—you'll enter it once the text is in a spreadsheet file. When working in the word-processing module, be sure you're using the 10 CI printer option for pitch, so you have 10 characters to the inch, which simplifies calculating column widths later.

After you're satisfied with the contents of your newsletter, decide on a format. I'll use two columns as an example here, but there's no reason why you can't have three or four columns just as easily. You want two columns of the same width, with a gutter of white space between them and equal margins on the left and right sides of the page. Using 8½ × 11-inch paper, we'll plan to have two columns 3 inches wide, with 1-inch left and right margins and a .5-inch gutter between the columns. The math is ((2*3″) + (2*1″) + .5″ = 8.5″).

The margins and gutter in the fi-

nal format will be taken care of once you've moved the text to the spreadsheet module, but while you're still using the word-processing module, you'll want to format your text into one long column 3 inches wide, so each line will contain a maximum of 30 characters. The default line width in the word-processing module is 65 characters, or 6.5 inches (8.5 inches minus two 1-inch margins), so if you increase the right margin to 4.5 inches, you'll be left with lines 3 inches long (4.5 + 1=5.5; 8.5 - 5.5 = 3"). With the cursor at the beginning of your text, use the printer-option command for the right margin (RM) to enter a value of 4.5.

Once you've converted your text into one long newsletter-size column, you can determine just how many columns of text you will have. A typical spreadsheet page prints 66 lines without top and bottom margins. You'll probably want to add .5-inch top and bottom margins, so, since you get 6 lines per inch, your printing length per page will be 60 lines. If you will be printing 60 lines per column and two columns per page, each page will have 120 lines of text, minus a few lines for headlines you add in the spreadsheet file. Move the cursor to the bottom of the text in your word-processing file and look at the line-number indicator to see how many lines of text you have. Then add or subtract text until you have approximately enough text to fill one, two, or more pages completely. You can make small textual adjustments later in the spreadsheet file.

Moving Text to a Spreadsheet

Now, you're ready to move the text to a spreadsheet file. The AppleWorks spreadsheet program can't read word-processing files directly, and it can't read the ASCII files you can produce with the word-processing program, but you can make a new spreadsheet from a DIF file. The link becomes the database program—it can read the ASCII file from the word-processing module and create a DIF file that the spreadsheet program can handle.

Save the word-processing file as an ASCII file on disk. You'll have to specify the file's pathname when you use it to make a database file, so give it a name that's easy to remember, such as Text. Once you've done so, choose the option to create a new database file from an ASCII file. AppleWorks will ask you how many categories of information you want in the new file—your answer will determine how many categories (or columns, in multiple-record layout) the file will contain. Since you want all of your word-processing text to appear in one long column, specify one category. After you enter a name for the new file, the word-processing text will appear in a database file, as in figure 1.

```
File: newsdb                          REVIEW/ADD/CHANGE   Escape: Restore fo

Selection: All records


Category 01
================================================================================
APPLE //E ENHAN
-
In this month's
news, we'll foc
get the most ou
//e computer.
big wishes the
usually develop
time using his
machine.  Let's
wishes one at a
discuss how to
-
More Storage
-
--------------------------------
Type entry or use @ commands
```

Figure 1: When you use an ASCII file from the word-processing module to create a new database file with one category, all the newsletter text appears in a single, narrow column in the multiple-record layout.

```
File: NewsFormat                                    REVIEW
========A========B========C========D=
  1|APPLE //E
  2|In this m
  3|news, we'
  4|get the m
  5|//e compu
  6|big wishe
  7|usually d
  8|time usin
  9|machine.
 10|wishes on
 11|discuss h
 12|More Stor
 13|Probably
 14|avid Appl
 15|shortage
 16|Apple //e
 17|have only
 18|space, wh
-------------------------------------
A1: (Label) APPLE //E

Type entry or use @ commands
```

Figure 2: When you use a DIF file from the database module to create a new spreadsheet file, all the newsletter text appears in column A.

In the database module, all you have to do is create a new Tables report format and print the text to disk as a DIF file. When you create the new Tables report, you'll notice that the category containing the text is much too narrow to display all the text. You know the text is no more than 30 characters wide, so just use the open-apple/right arrow command to widen the category until the Len indicator at the right side of the category is greater than 30. Once it is, print the report to disk as a DIF File, using a descriptive name such as Dif.

Now, you can choose the option to create a new spreadsheet file from a DIF file. Enter the pathname for the DIF file you made from the database and type a name for the new spreadsheet file, and your text will appear in Column A of a new spreadsheet, as in figure 2.

Columns in the Spreadsheet

From here, it's a simple matter to format your text the way you want. Remember, the spreadsheet is your newsletter's format, so you must adjust the positions of subheads, the newsletter title, and article titles here.

First, we'll widen the columns to the desired size. Although the text you've transferred is squeezed into the spreadsheet's default nine-character column width in column A, you can widen the column with the Layout command to show ev-

erything. As you widen the column, though, you'll need to count characters to see exactly how wide the column is.

Your text is 30 characters wide, but you want a half-inch gutter between the left and right columns. Since text or labels in the spreadsheet are normally left-justified, the gutter will consist of the extra space between the end of the text and the actual right edge of the left-hand column. By making column A 5 characters wider than your text, you'll have half an inch of white space between the text in column A and the text in column B. Therefore, you want column A to be 35 characters wide. Once you've reformatted column A, use the Layout command to widen column B until it is also 35 characters wide (the extra space at the right of this column will simply become part of the page's right margin).

Next, insert three rows at the top of the spreadsheet and type the newsletter's banner—the title and publication-date information—in column A. If your title and publication information take up more than 35 characters, the label will automatically extend into column B, but be sure not to exceed 70 characters, because the text must fit into columns A and B. If you have more than one line of information in your newsletter's banner, insert extra rows and enter the information. In the line below the bottom of your banner text, type a quotation mark to indicate a label, and then insert a dashed line or a row of equal signs across both column A and column B to separate the banner from the newsletter copy.

If your headline is more than 35 characters long, insert another row and use two lines. Next, go through the text itself and insert rows to add spacing around subheads and between paragraphs, since all the blank spaces you started with in the word-processing document disappeared when you saved the database file in the DIF format.

Fitting Text into Column B

Now, you're ready to move part of your text out of column A and into column B to create the two-column layout. How much of the text do you move? It's easy to determine. In the spreadsheet each row, or line of text you've transferred, is numbered. To determine the length of your columns, simply subtract top and bottom margins from your page length. The Printer Options screen in the spreadsheet module shows that you're using 11-inch paper and are printing 6 lines to the inch, so that you can print 66 lines on the page if you have no top and bottom margins. If you set your top and bottom margins for .5 inch each, you will have 60 printed lines on the page. Let's use 60 lines as our number.

Since you will print 60 lines on the page, you know that all text from row 61 down will print on the next page. Therefore, you want to scroll down to row 61 in the spreadsheet and move the appropriate amount of text from there into column B. Figure 3 shows the column B text already in place. Notice that the text in column B begins in cell B4, so it lines up with the beginning of the text in column A. Since the column B text begins in row 4 and runs to row 60, you know you need to copy 56 rows of text from column A.

Although you want to move the text, you can't use the spreadsheet module's Move command because it moves entire rows of data. You want to move cells from column A and place them in column B, and the Move command won't let you select only column B as a destination. Instead, you must use the Copy command.

Move the cursor to cell A61. Choose the Copy command and the Within Worksheet option, and then move the cursor down to the row 116 (to select 56 rows of text). Once you've selected the text, press the Return key. Next, move the cursor to cell B4 and press the Return key. A copy of your text from rows 61–116 in column A will now appear in column B, and the first newsletter page is finished, as you see in figure 4.

Now, scroll down to row 61 in column A, which will be the first row at the top of your second page. First, you must use the Blank command to delete the text in cells A61–A116, since this is the text you copied to column B on the first page of the newsletter. You can then scroll down to row 117 and move the appropriate amount of text up so it starts at cell A61. To make sure you don't copy text on top of itself, you must copy the next 60 rows of text from column A

```
File: NewsFormat                    REVIEW/ADD/CHANGE                    Escape: M
=====================A=================================B===============
  1|PUG NEWS - Pasadena User's Group Newsletter - January, 1987
  2|-----------------------------------------------------------------------
  3|
  4|APPLE //e ENHANCEMENT
  5|
  6|In this month's issue of PUG        programs from one place.
  7|news, we'll focus on how to
  8|get the most out of the Apple       More Memory
  9|//e computer.  There are a few
 10|big wishes the //e owner            Another big wish for //e users
 11|usually develops after a short      is for more memory, or RAM.  A
 12|time using his or her new           standard Apple //e comes with
 13|machine.  Let's look at these       128K of memory, which is
 14|wishes one at a time, and           considerable less than the
 15|discuss how to gratify them.        640K on an IBM PC or the 512K
 16|                                    on the least expensive
 17|More Storage                        Macintosh.  If you run a small
 18|                                    business on your //e, you may
-----------------------------------------------------------------------
B1: (Label, Layout-L) wsletter - January, 1987

Type entry or use @ commands                                        @-? f
```

Figure 3: Row numbers in the spreadsheet help you determine exactly how much text will fit on each page and where to place text in each column.

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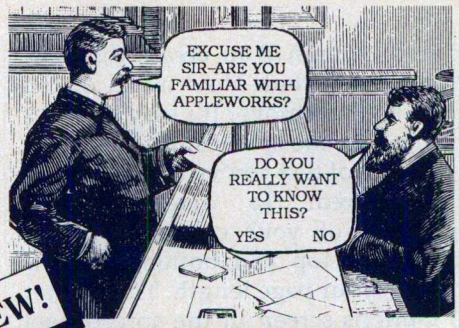
- "Undo" the last delete command
- Many more.

❑ **FOR THE WORD PROCESSOR, DATA BASE AND SPREADSHEET**
Create macros for all three applications. For example, in the Spreadsheet, you may find yourself typing the same series of keystrokes every day to sort a column of numbers. Set it up as a one-key macro!

❑ **PERSONALIZED HELP**
Rewrite AppleWorks' "Help" screens to display whatever information you want.

❑ **DESKTOP EXPANDER COMPATIBLE**
Works with the Applied Engineering™ and Checkmate™ Desktop Expanders.

❑ **NOT COPY PROTECTED**
You can install MacroWorks on a floppy disk, 3.5" disk, hard disk or RAM disk.



NEW!

SUPER MACROWORKS

by Randy Brandt
$49.95–Apple IIGS, IIc and 128K IIe
For new AppleWorks version 2.0.
(Version 1.3 & earlier requires MacroWorks.)

←MACROWORKS FEATURES PLUS...

Super MacroWorks provides the same AppleWorks enhancements and improvements as MacroWorks (left), **PLUS** the features below.

❑ **AUTO STARTUP**
Boot AppleWorks and it gets itself up and running without another keypress. You can also have any file automatically load, so you're ready to go to work!

❑ **DIRECTORY DATABASE**
Quickly read the file names from any or all of your ProDOS disks into the Data Base. Search and sort by file name, type, date, etc., and make printouts, to see what's *really* in that disk library of yours.

❑ **ON-THE-SPOT COMPILING**
Create and compile new custom macros "live" without leaving AppleWorks.

❑ **NO MORE TYPING PATHNAMES!**
When you want to access another disk or directory, you now select from a menu instead of typing a pathname. Simply highlight the directory name you want–it's just like loading files.

❑ **LINKED FILES**
Many possibilities–like the ability to define custom macros that work with a particular file. One keystroke can load a file, then load its associated macros.

❑ **READ-THE-SCREEN MACROS**
Lets you do many things, like convert characters, words or paragraphs from lower-case to UPPER-CASE and back.
And now you can cut and paste *anywhere*, including from field-to-field and record-to-record in the Data Base.

❑ **LOCAL/GLOBAL MACROS**
Define macros that work differently in different applications. For example, you could make 🍎-N do 3 different things:
- Word Processor ..... Type your name
- Spreadsheet ..... Type "3.14159"
- Data Base ..... Sort by Zip code

❑ **TIME & DATE MACROS**
One 🍎-keystroke automatically types the current date or time in any document.

Trade Up to SUPER MACROWORKS

MacroWorks owners with AppleWorks 2.0 may get a Super MacroWorks trade-in by mailing the front cover of their MacroWorks manual+$22.50 to Beagle Bros. (Calif. add $1.20 tax)

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by Rob Renstrom
$39.95–any Apple II (64K minimum)

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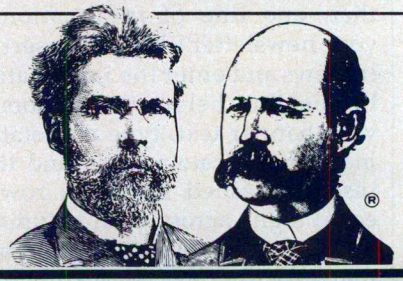
OUR FONTS OR YOURS
Ten different fonts are included on the disk. An easy-to-use font editor lets you redraw any character in our fonts or design your own fonts from scratch.

APPLEWORKS COMPATIBLE
In fact, Power Print is *everything* compatible. Just download a font (in less than 2 seconds), then boot AppleWorks, AppleWriter, ProDOS, DOS 3.3–or practically anything else–and custom printing is yours!

MIX GRAPHICS AND TEXT
Design up to 96 custom characters that combine to print a small illustration.

You may then include this drawing as part of your regular printouts.
←This logo was actually typed with AppleWorks and printed on an Apple ImageWriter. Other software and printers work equally well.

FULL-SPEED AHEAD!
Unlike other font software, Power Print *won't* slow your printer down one bit. Power Print works with most full-font downloadable printers, including:
APPLE DMP and **IMAGEWRITER** (I and II), **BROTHER** M1509, **CITIZEN** (20, 25), **EPSON** (EX, FX, JX), **OKIDATA** (92, 93, 192, 193), **PANASONIC** (1092, 1093), **STAR** (Delta, Radix, SG, SD, SR), and others



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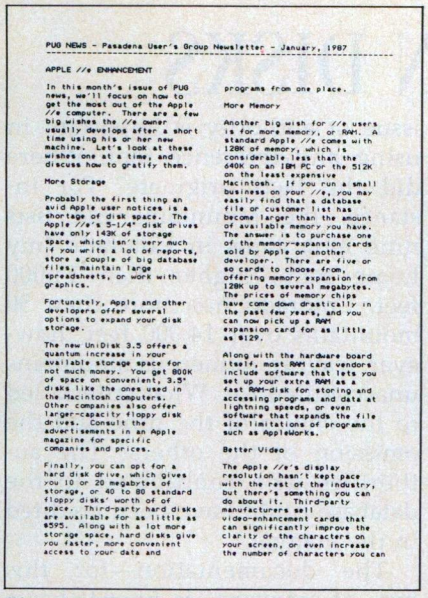

PUG NEWS - Pasadena User's Group Newsletter - January, 1987

APPLE //e ENHANCEMENT

In this month's issue of PUG news, we'll focus on how to get the most out of the Apple //e computer. There are a few big wishes the //e owner usually develops after a short time using his or her new machine. Let's look at these wishes one at a time, and discuss how to gratify them.

More Storage

Probably the first thing an avid Apple user notices is a shortage of disk space. The Apple //e's 5-1/4" disk drives have only 143K of storage space, which isn't very much if you write a lot of reports, store a couple of big database files, maintain large spreadsheets, or work with graphics.

Fortunately, Apple and other developers offer several options to expand your disk storage.

The new UniDisk 3.5 offers a quantum increase in your available storage space for not much money. You get 800K of space on convenient, 3.5" disks like the ones used in the Macintosh computers. Other companies also offer large-capacity floppy disk drives. Consult the advertisements in an Apple magazine for specific companies and prices.

Finally, you can opt for a hard disk drive, which gives you 10 or 20 megabytes of storage, or 40 to 80 standard floppy disks' worth of of space. Third-party hard disks are available for as little as $595. Along with a lot more storage space, hard disks give you faster, more convenient access to your data and programs from one place.

More Memory

Another big wish for //e users is for more memory, or RAM. A standard Apple //e comes with 128K of memory, which is considerable less than the 640K on an IBM PC or the 512K on the least expensive Macintosh. If you run a small business on your //e, you may easily find that a database file or customer list has become larger than the amount of available memory you have. The answer is to purchase one of the memory-expansion cards sold by Apple or another developer. There are five or so cards to choose from, offering memory expansion from 128K up to several megabytes. The prices of memory chips have come down drastically in the past few years, and you can now pick up a RAM expansion card for as little as $129.

Along with the hardware board itself, most RAM card vendors include software that lets you set up your extra RAM as a fast RAM-disk for storing and accessing programs and data at lightning speeds, or even software that expands the file size limitations of programs such as AppleWorks.

Better Video

The Apple //e's display resolution hasn't kept pace with the rest of the industry, but there's something you can do about it. Third-party manufacturers sell video-enhancement cards that can significantly improve the clarity of the characters on your screen, or even increase the number of characters you can

Figure 4: This finished two-column page, printed from the spreadsheet, is a refreshing alternative to normal formatting in the word-processing module.

into column C, blank the original text in column A, copy the text from column C to the correct location in column A, and then blank the text in column C to remove it. Let's say, for example, that your column A text on page 2 is originally in cells A117–A176. Select that text and copy it to column C. Then, blank cells A117–A176 and use the Blank command to erase them. Next, copy the text from column C to cell A61, so it fills cells A61–A120. Finally, use the Blank command to erase the text from Column C.

After you've placed the column A text properly, you can copy the column B text into its correct position. The process continues as established until you've formatted all the pages of your newsletter.

Touching Up and Printing

If you try this data-movement and column-formatting technique once, you'll see how easy it is to format data into columns quickly. You can use the spreadsheet module's Layout command to center or right-justify subheads or headlines. You can insert or delete rows to close up open space—if you do it before you've placed one column of text beside another. You can adjust columns of text up or down on the page by copying them to another column and then back again. You can create more columns or wider columns by adjusting the left and right margins in the spreadsheet or changing the column widths. You can also do some minor editing of the text, as long as you remember that each line of text in each column is really a spreadsheet cell and that the text won't wrap around to the next line if you exceed the cell's boundaries.

If you want to add page numbers to the bottom of your pages, just leave the bottom row (row 60 on page 1) blank and type the numbers in manually in the bottom-row cell of column A (A60 on page 1). Since you're typing a value, the number will be right-justified and will appear at the edge of the column near the center of the page.

When you're ready to print your newsletter, check the spreadsheet module's Printer Options menu to make sure the Print Header (PH) option is set to No; otherwise, your newsletter will print out with a filename and page number at the top of each page. You can also enter a special printing code to print the newsletter in the Letter Quality mode or other enhanced formats. Check for the appropriate code in your printer's manual and then enter it as a special code in the spreadsheet file with the SC printer option. You can even use a font program to print with a custom font, as long as you experiment to see that the size of the font you select is approximately the same as that of the standard AppleWorks characters; otherwise, your columns may be wider or narrower than you planned.

It doesn't give you the flexibility of The Newsroom or other desktop-publishing programs, but this technique can help you crank out a quick newsletter or dress up your AppleWorks documents with multicolumn formats. ✚

Contributing Editor Charles Rubin is the author of AppleWorks *and* Command Performance: AppleWorks, *both from Microsoft Press. He writes about computing for various publications.*

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SHORT REPORT
BY LEE HAYWARD

FACTWORKS INFORMATION DISKS

Imagine the power of AppleWorks combined with the power of an encyclopedia. Thousands of facts can be at your fingertips, with the ability to sort, search, and print at any time. This is the claim of FactWorks, a three-disk set of AppleWorks files from ImagiMedia. With FactWorks, you can figure out the payments on that new car you want, find out who was the third vice president of the United States, look at a list of Grammy winners, or obtain a copy of the Gettysburg address for a report.

To use FactWorks, you boot AppleWorks and then load FactWorks as you would any AppleWorks file. Several of its files are larger than 10K. Volume 1 contains 26 files with "home reference" files and information about animals and geography. Volume 2, with 33 files, concentrates on science, sports, and a bit of home reference. The third volume has 29 files on history, people, and documents/forms.

Let's look at volume 1 in a little detail. The first file that caught my attention was Dinosaurs. Since I am an elementary-school librarian and the father of 2 girls, I get a lot of requests for information on this subject. This database has 321 records presented in five fields: dinosaur (name), suborder, family, where first discovered, and notes. The package has similar files on cats, dogs, mammals, and reptiles.

The problem I have with calling this software an encyclopedia is that an encyclopedia, usually 20 or more volumes, provides detailed information about a particular subject, not just a listing of information in a database. Second, as a teacher and librarian, I believe the issue of authority is important in using any reference tool. Where did the facts originate? For instance, the Mountains file lists nine mountains in Colorado (my home state) higher than 14,000 feet. Colorado has more than 50 mountains over 14,000 feet, however, leaving numerous mountains unaccounted for. What criteria led to the choice of the nine and the omission of the others? The authorities who contributed to the database could have been credited in the manual.

The documentation—for this type of software—is fine. It has a small section on using the program and some hints and techniques for using the files. Because of the nature of the software, it is not copy-protected, and ImagiMedia encourages you to make working copies (it supplies preprinted disk labels

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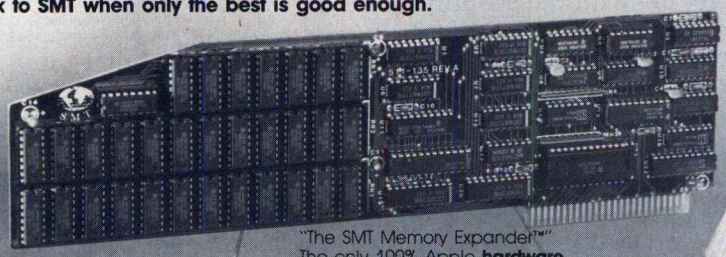

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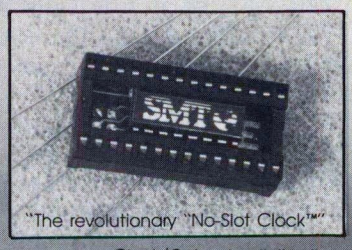

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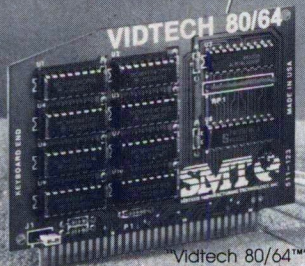

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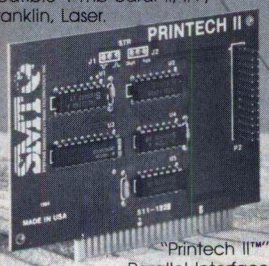

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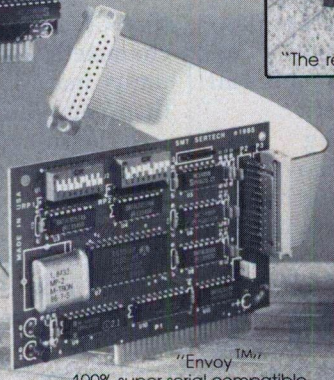

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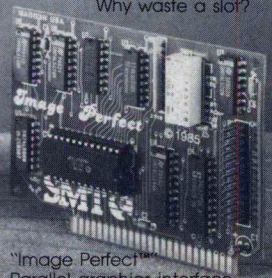

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for your disks), so you always have the original in case of a problem or mistake. ImagiMedia guarantees the master disks for life, with free replacement if a file fails to load. In addition, it provides a daytime support phone number to answer questions about FactWorks. Since FactWorks files are AppleWorks files, you can also add your own information to the various databases and spreadsheets and save them to a data disk.

Despite the concerns I've mentioned, I like this package. The disks contain something for almost everyone, with information that is often hard to track down (such as a list of the United Nations members) when you need it. The home-mortgage spreadsheet is fast and lets you see what your new monthly payments will be. I also like the way the authors have laid out the screen displays in the databases by using a little-known feature of AppleWorks to change the layout of the single-record display. (You can try this technique by zooming in on a single record and then typing open-apple/L to arrange the fields anywhere in the screen.)

I expect to see more volumes of FactWorks and think that many schools and families will appreciate having this kind of information at their fingertips. ✚

Lee Hayward is an elementary-school media specialist in the Cherry Creek school district in Colorado. In his spare time, he is the chairman of TAWUG, The AppleWorks Users Group, a clearinghouse for AppleWorks information and templates.

PRODUCT INFORMATION

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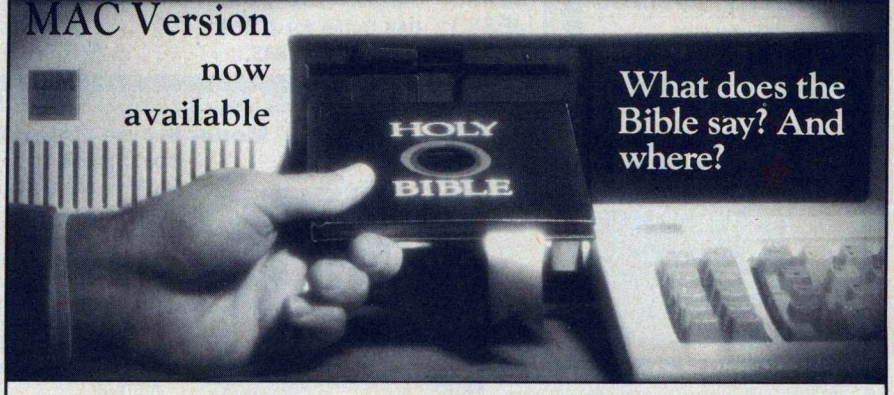

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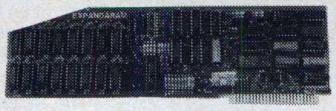

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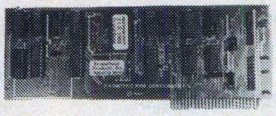

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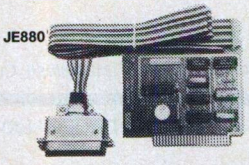

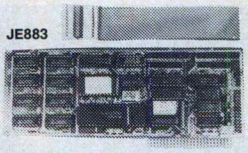

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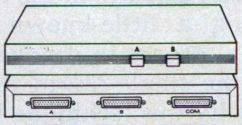

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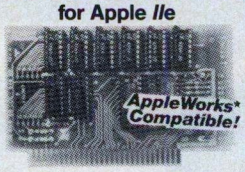

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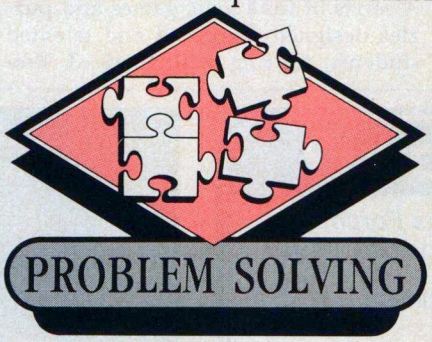

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VITAL STATISTICS

List Price: $49.95

Requires: Apple II Plus, IIe, or IIc; 48K RAM; 5¼-inch disk drive. DOS 3.3; copy-protected (backup copy $7.50); does not work with mouse; game paddles optional.

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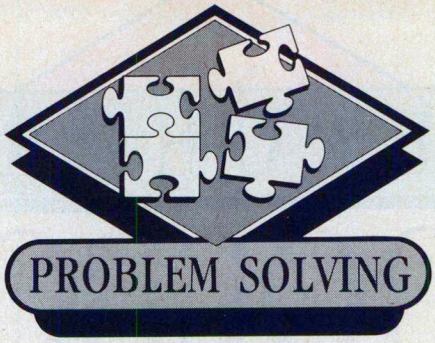

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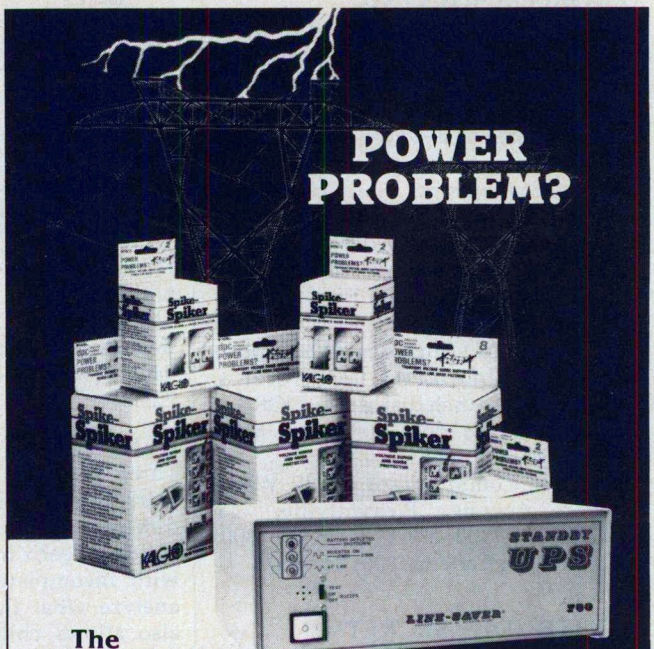

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CIRCLE 116 ON READER SERVICE CARD

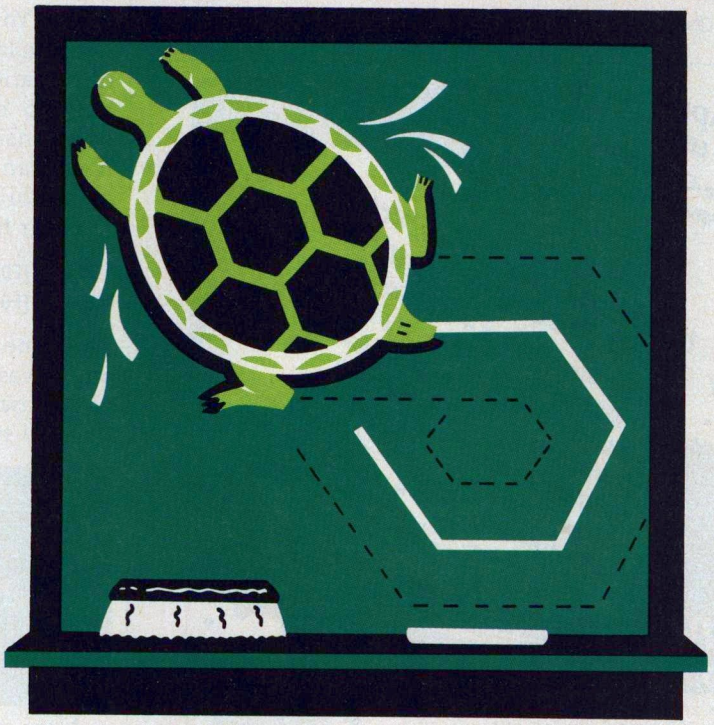
BY DAVID D. THORNBURG

LOGO, STARS, AND MATHEMATICS

An unconventional lesson in core math concepts

Many of us who have supported the use of Logo in education have been disappointed by the poor penetration of this language into the classroom. Much of the reluctance to embrace Logo has arisen from some teachers' belief that Logo activities do not tie directly into the curriculum. Many Logo proponents, including Logo's "father," Professor Seymour Papert, have been harshly critical of traditional math education and have thus placed some teachers in the untenable position of having to choose between Logo or more "conventional" methods of math instruction.

By attacking a perception of today's math activities as little more than rote drill and practice, some in the Logo community have alienated the very people they are trying to help.



Today's teachers do not establish the curriculum, but they do have the power to choose the tools through which the curriculum is implemented. Some people may be surprised to learn that Logo can function in a way that encourages children to make discoveries that tie in exactly with traditional math education. This connection will grow even stronger as other states follow California's lead in revising their K–12 mathematics programs (see "Learning Curve," *A+*, March 1987).

To illustrate how Logo can tie in smoothly with traditional math, I will present a special Logo lesson step by step and then show how it fits into the larger educational framework. Even if you are unfamiliar with Logo and its commands for creating graphic images, I hope you will be able to glean a great deal from this lesson. In the interest of space, we will be racing along, stopping only to look at the highlights along the way, but many hours' worth of productive discoveries are hidden here.

Most students get to know Logo as a computer language with powerful commands for creating pictures. Instructions such as FORWARD (or FD) and BACK (or BK) move a graphic object (called a turtle) on the screen, leaving a line to show its movement. You can turn the turtle left or right by various angles with the commands LEFT and RIGHT (or LT and RT). By using these commands in combination with each other, you can draw pictures of extreme complexity on the screen.

The following lesson explores the mathematics behind the drawing of star polygons. We will begin with a traditional starting place, the creation of simple polygons. If you have Logo running on your computer and you enter

```
REPEAT 4 [FD 50 RT 90]
```

a square will appear on the screen. Each side is 50 units long, and each corner is the result of turning the turtle to the right by 90 degrees. If you now enter

```
REPEAT 5 [FD 50 RT 72]
```

a pentagon will result, and the command

```
REPEAT 6 [FD 50 RT 60]
```

will draw a hexagon (see figure 1).

Notice that as the number of

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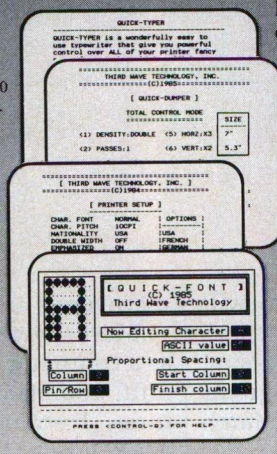

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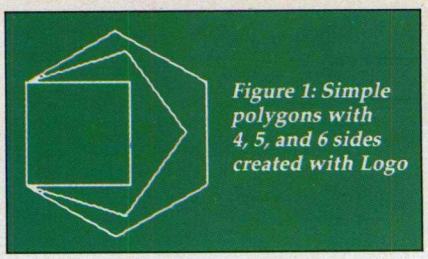

Figure 1: Simple polygons with 4, 5, and 6 sides created with Logo

sides increases, the turning angle decreases. Is there a pattern to this reduction? Yes, there is. Multiply the number of sides by the turning angle to see what it is.

Now let's clear the screen and enter the following commands:

```
REPEAT 5 [FD 50 RT 72]
REPEAT 5 [FD 50 RT 144]
```

The first line creates a pentagon, and the second draws a five-pointed star (see figure 2). What is the same about these two lines of commands? What is different about them? You may notice that 144 is twice as large as 72. Does this bit of information give you a clue about how to create stars from simple polygons? Let's find out by seeing if we can create a six-pointed star by doubling the turning angle.

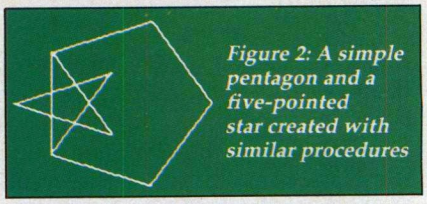

Figure 2: A simple pentagon and a five-pointed star created with similar procedures

Clear the screen and enter

```
REPEAT 6 [FD 50 RT 60]
REPEAT 6 [FD 50 RT 120]
```

This time the effect of doubling the angle was to give us a triangle (that was drawn twice) instead of a six-pointed star (see figure 3). Hmmm!

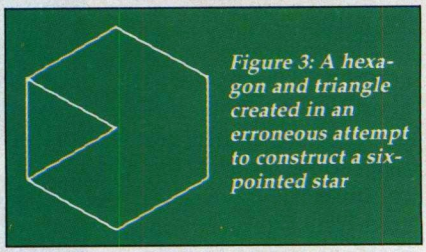

Figure 3: A hexagon and triangle created in an erroneous attempt to construct a six-pointed star

Next we can conduct some experiments with different numbers of sides and different multipliers. To simplify our typing, we can define a procedure such as

```
TO POLY :M :N
   REPEAT :N [FD 50 RT (:M * 360 / :N)]
END
```

POLY 1 5 draws a pentagon, and

POLY 2 5 draws a star.

To perform a definitive experiment, you should notice what happens when you choose different values of :M and :N. If you build a table showing which values yield stars with :N sides, a pattern emerges (see figure 4).

Number of sides

Multiplier	4	5	6	7	8	9	10
1	N	N	N	N	N	N	N
2		Y	N	Y	N	Y	N
3				Y	Y	N	Y
4						Y	N

Figure 4: A table showing the appearance of stars for various values of :M and :N

The reason we used values of :M that were less than half the value of :N is that larger values don't yield any new figures; all they do is create mirror images of the polygons that the lower values produced. (Why this happens is worth exploring!)

Now let's look at the table in figure 4 to see what we can discern about the combinations of numbers that yield stars. What we find is that we get a star of :N sides only when :M and :N are "relatively prime"—in other words, when they share no common factors except 1.

From this observation we can predict whether a certain pair of numbers will produce a star and can then test our prediction on the computer.

Although this example of guided discovery is structured, it still leaves plenty of room for learners to make discoveries and form hypotheses. Once students have completed this lesson, they will have had experiences in these "core" math areas: number theory, geometry, estimation, mental arithmetic, problem solving, algebra, logic, pattern recognition, and graphing.

This approach to Logo disturbs some purists who believe I am corrupting the language by structuring its use. From a student's perspective, however, this method of making fundamental discoveries about a complex topic is a refreshing change from simply receiving a rule to be memorized. It allows the teacher to become, in the words of Dr. Roger Taylor, "a guide on the side, not a sage on the stage." ✚

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o	Commodore MPS 801, Comrex 220	5.00	4.50	6.00	5.50	—	—
o	Commodore 1525/Gorilla Banana	5.00	4.50	6.00	5.50	—	—
Po	Epson AP 80, Seikosha 1000, RS-DMP130	7.00	6.50	8.00	7.50	9.00	8.50
•	Epson DX 10/20, Silver Reed EXP 400/550	5.50	5.00	6.50	6.00	—	—
	Epson EX 800/1000	Call	Call	—	—	—	—
*	Epson JX 80	4.50	4.00	11.00	10.00	—	—
•	Epson LQ 800 (HD)	6.00	5.50	7.00	6.50	—	—
	Epson LQ 1000 (HD)	7.00	6.50	—	—	—	—
Po	Epson LQ 1500	5.50	5.00	6.50	6.00	—	—
	Epson LQ 2500	Call	Call	—	—	—	—
P+	Epson LX 80/86/90, Homewriter 10	5.00	4.50	6.00	5.50	7.00	6.50
P+	Epson MX, FX, RX 80/85, Citizen 10/20	4.50	4.00	5.50	5.00	6.50	6.00
Po	Epson MX, FX, RX 100/185, Citizen 15/25	6.00	5.50	7.00	6.50	8.00	7.50
Po	IBM Proprinter	5.50	5.00	6.50	6.00	7.50	7.00
	IBM Proprinter XL	7.50	7.00	—	—	—	—
*	IDS Prism	8.00	7.50	11.00	10.00	—	—
	Nec P6/P2 (HD)	7.00	6.50	—	—	—	—
	Nec P7/P3 (HD)	8.00	7.50	—	—	—	—
	Nec P5 (HD)	7.00	6.50	—	—	—	—
P+	Okidata 82/83/92/93, Star SG10, Gemini 10X	2.50	2.25	3.50	3.25	4.50	4.00
	Okidata 84	4.00	3.50	—	—	—	—
P•	OKI 120/182/192/193	6.00	5.50	7.00	6.50	—	—
	OKI 292, 293	Call	Call	—	—	—	—
Po	Panasonic 1080,90,91,92	7.00	6.50	8.00	7.50	—	—
	Panasonic 1093, RS LP VI+VIII	5.00	4.50	—	—	—	—
•	Smith Corona D200/RS DMP 120	6.00	5.50	7.00	6.50	—	—
•	Star NX 10	6.00	5.50	7.00	6.50	—	—
o	Toshiba 1350/1351/RS DMP 2100	6.00	5.50	7.00	6.50	—	—

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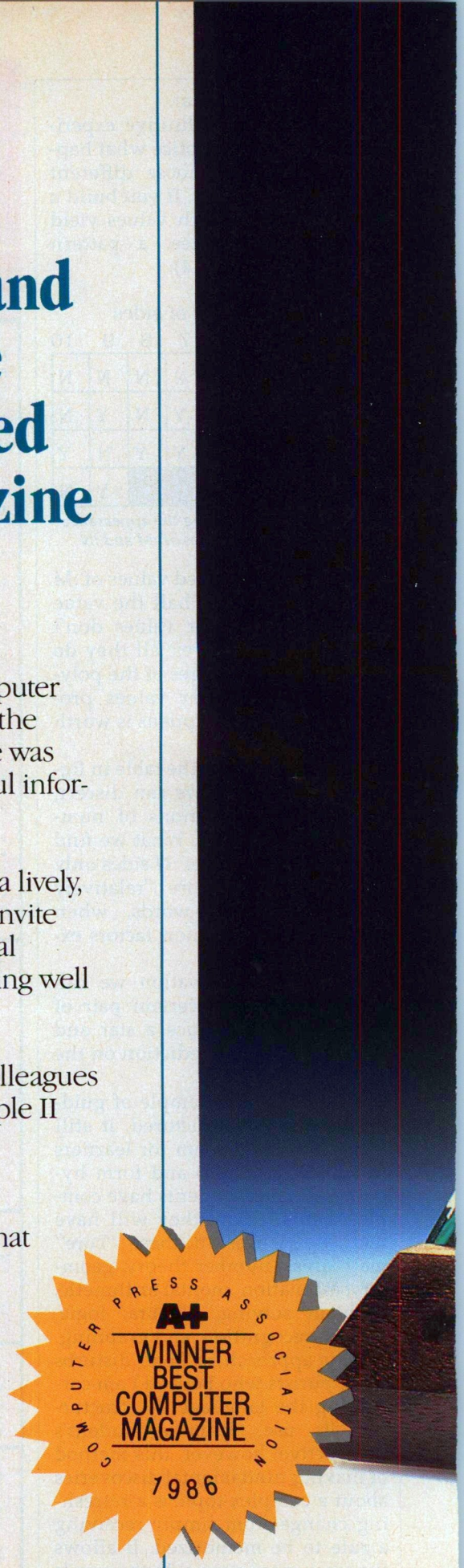
Computer Press Association

On April 7th, 1987, A+ Magazine received the prestigious Citizen America/Computer Press Award as the Best Computer Magazine. Chosen from a list of impressive entries from the Apple, IBM and general interest magazines, A+ Magazine was recognized as the Best Magazine of 1986, providing useful information to its targeted audience.

At the awards ceremony, it was said that "A+ Magazine is a lively, fast-paced magazine that is well designed and edited to invite Apple II users into its pages, satisfying their informational needs. In particular, A+ did an outstanding job in providing well rounded coverage of the new Apple IIGS..."

We are very proud and honored that our professional colleagues have recognized our achievement in creating the #1 Apple II Magazine, confirming A+ as the "Reader's Choice" for all Apple II users.

This award as the "Best Computer Magazine" confirms that A+ Magazine is the information source for all Apple II owners and users.



The #1 Apple II Magazine

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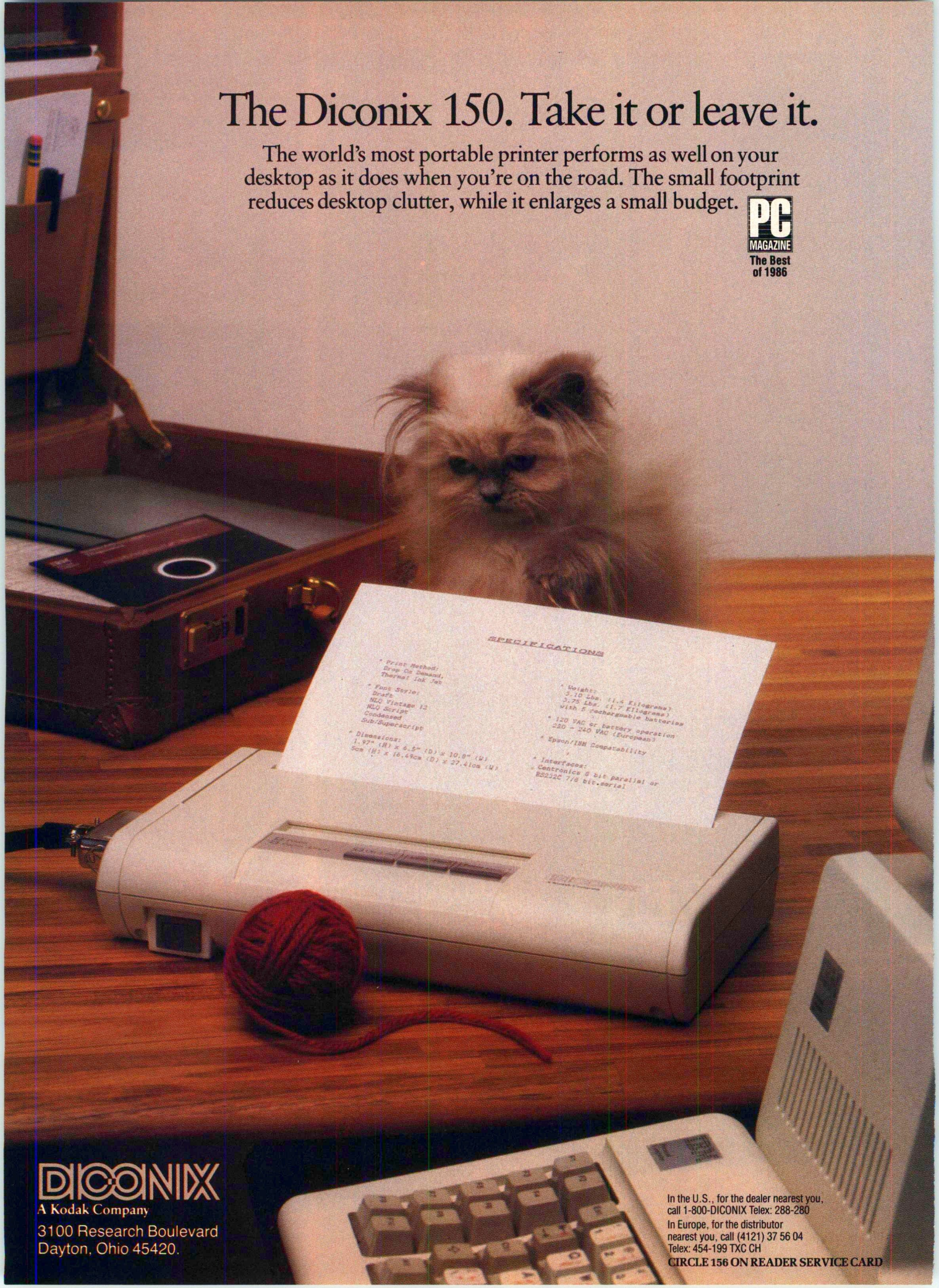

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CIRCLE 156 ON READER SERVICE CARD

BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

GRAPHICS GALLERY GLEANINGS

Guidelines for submissions, and word on three updates

We're delighted to tell you that we've been swamped with submissions for "Speaking of Graphics Gallery," and they're wonderful! Not only does this response give us a chance to see your work, but it also tells us what software and hardware you're using. Double-hi-res graphics created with Dazzle Draw seem to be dominating, although we've also received hi-res, double-hi-res, and super-hi-res images created with a variety of other programs. To date, landscapes are the prevailing subject matter. Most of you appear to be using an AppleMouse for input, and many of you use the ComputerEyes video-acquisition system. Is anyone using a light pen?

Contributions are coming from readers ages 8 and up! We've received lots of disks from schoolteachers across the country who are doing exciting work with Apple graphics in the classroom. We're saving these for an upcoming issue of *A+* that will focus on education. If you're a teacher who's working with Apple graphics, we'd love to hear about it. Send us your students' work and a description of what they're doing.

Although looking at your graphics is great fun, it can turn into a chore if you don't send your work on a self-booting disk that includes a slide show. Since you're using a variety of graphics programs, we've had to boot the appropriate program, look at a few images, boot another program, look at some images, boot another program, and so on, and so on. So bear with us while we establish some official guidelines for all "Speaking of Graphics Gallery" submissions.

Slide Shows

For graphics created with Dazzle Draw, use the Make Slide Disk option on the File menu. This option puts the ProDOS operating system and a slide show onto your blank disk. Next, save your completed images (up to six pictures) onto this disk. When you're ready to send us the disk, boot it, and you'll find easy-to-follow instructions for establishing the order in which you want the images to appear. You also get a choice of transitions and delays between pictures. Please select option 1, No Fade, and then option 9, Wait for Keypress. Doing so allows us to display each image as long as necessary to photograph the screen, after which we can press a key to view the next image.

For graphics created with Paintworks Plus, save your graphics as type $C1 files (screen format), and you can use the slide-show program we gave you in our last column (*A+*, "Speaking of Graphics," June 1987) or a comparable presentation program.

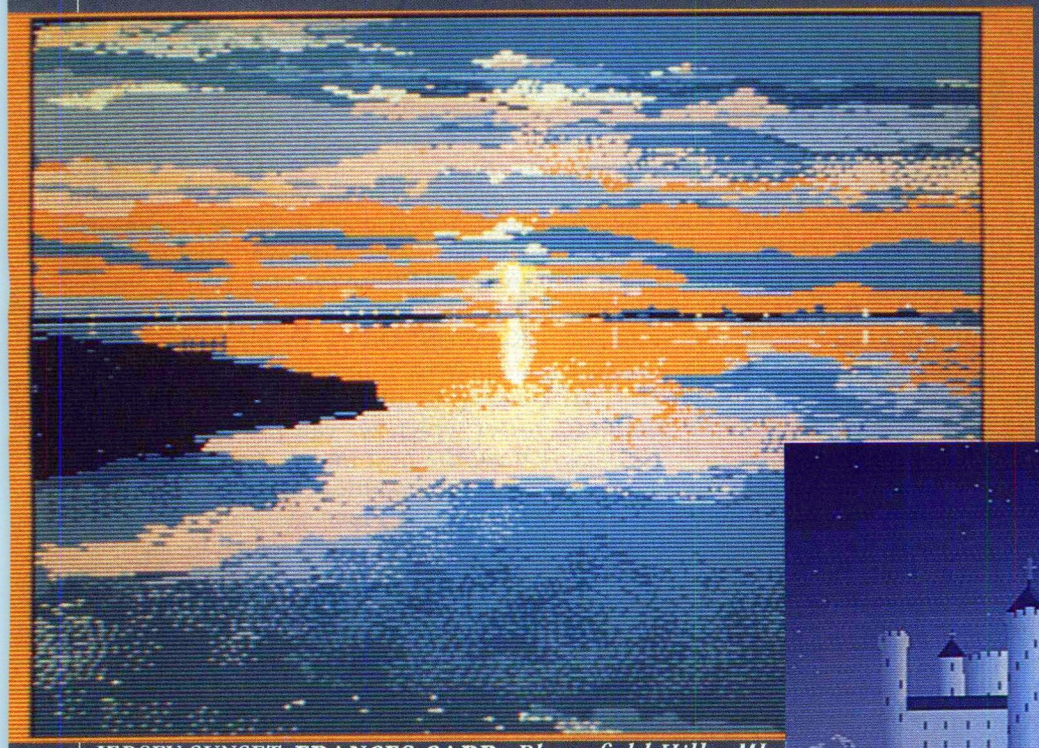
For graphics that you have created with Beagle Graphics, use the program Slide.Show, which is on the Beagle Graphics disk. Instructions for using this program are in

FIGURE 1: SLIDE-SHOW PROGRAM

```
1 TEXT: HOME
2 L1=8192: L2=16384: LOC=L1
3 READ F$
4 IF F$="DONE" THEN GOTO 5
5 PRINT CHR$(4); "BLOAD";F$;",A";LOC
6 C=C+1
7 IF C=1 THEN POKE -16297,: POKE -1632,: POKE -1634,
8 IF LOC=8192 THEN POKE -163,: LOC=L2: GOTO 1
9 POKE -16299,: LOC=L1
10 GOTO 3
15 END
1000 DATA picname1
1100 DATA picname2
1900 DATA DONE
```

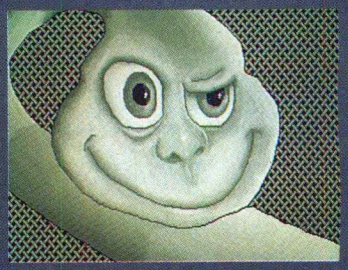
SPEAKING OF GRAPHICS GALLERY

Our gallery this month shows a distinct divergence of graphic styles, from Karl Shores' hard-edged, monochromatic images (super hi res created with Paintworks Plus on the IIGS) to Frances Carr and Michael LaMark's soft-edged, colorful scenes (super hi res created with Paintworks Plus on the IIGS and double hi res created with Dazzle Draw and a mouse on the IIe, respectively).



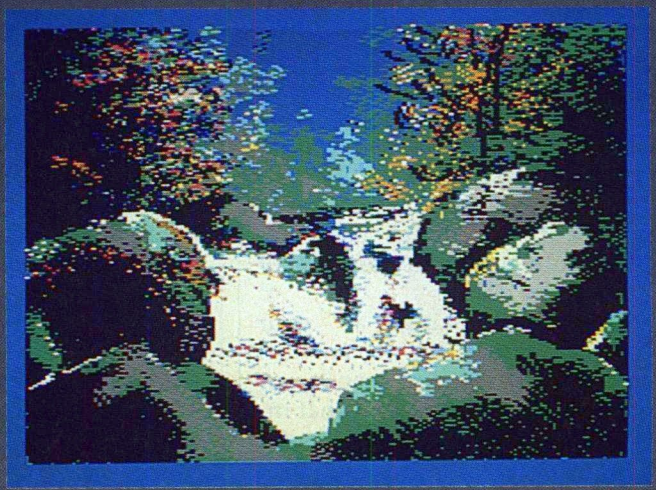
JERSEY SUNSET, **FRANCES CARR,** *Bloomfield Hills, MI*

Karl Shores writes: "Wilma is a rather large worm that lives in our tool shed. She subsists entirely on pistachio ice cream."



CASTLE, **KARL W. SHORES,** *Redwood City, CA*

OTTER CREEK, **MICHAEL LaMARK,** *Pittsburgh, PA*



A+ invites readers to submit artwork created with the Apple II to the "Speaking of Graphics Gallery." We will pay $25 for pictures selected for publication. Submissions must be on a diskette and include a written description of the hardware and software used. When submitting pictures made with Dazzle Draw, please format your disk with a slide-show option so we can boot the disk and look at the pictures. Send your artwork to *A+* magazine, 11 Davis Drive, Belmont, CA 94002, Attn. Graphics Gallery. Submissions cannot be returned.

the Beagle Graphics manual.

If you're using Blazing Paddles, Complete Graphics System, or any other standard hi-res-graphics program, and if you don't already have a slide-show program, you can use the one in figure 1. Put the names of your pictures in the DATA statements starting at line 1000. Be sure to include the last line, 1900 DATA DONE, in the program.

Documentation

When you send in "Graphics Gallery" submissions, be sure to put your name and the name of the graphics program you used on the disk label.

On a separate sheet of paper include your name, address, title of pictures (in the order they're displayed on the disk), the name of the program you used to create the images, the graphics-input device(s) you used, and the computer you used. Along with this information, feel free to include any descriptive notes about yourself and/or your work.

We've received lots of disks from teachers across the country who are doing exciting work with Apple graphics.

We appreciate your cooperation and look forward to seeing your Apple art.

Update – ComputerEyes

As evidenced by "Graphics Gallery" submissions, many of you are using the ComputerEyes video-acquisition system. Since Roberta reviewed ComputerEyes (see *A+*, August 1986), Digital Vision has released ComputerEyes/2 for the Apple II family of computers. We use it on the Apple IIGS, in the IIe emulation mode, without a problem. (Digital Vision will soon release special software to let it work with the Apple IIGS gray-scales, as well as a new, full-color digitizer for the IIGS).

ComputerEyes/2 is a board that plugs into any slot of an Apple II Plus, IIe, or IIGS. It captures both standard and double-hi-res images in less than six seconds. A preview function lets you see the video input on your monitor before you capture it, a significant option that lets you focus your camera. The program runs under either ProDOS or DOS 3.3.

New enhancement software features conversion programs that convert an Apple hi-res image to double hi res (and back). They can also convert ComputerEyes/2 images to Print Shop Graphic format or Newsroom Photo format, or even Print Shop Graphic format to Newsroom Photo format, and vice versa. You can shrink or expand images by 1% increments or flip, invert, or scroll them. (This option is especially useful if your printer tends to squash or stretch images.) If you have a Video-7 Enhancer or Legend E' Card in your Apple IIe, you can also acquire impressive gray-scale (16- shade) images. For a limited time, Digital Vision is offering its customers a special purchase price for the Video-7 card. The price is less than half the list price, so if you work a lot with digitized images, we suggest you contact the company.

We found ComputerEyes/2, with the enhancement software, to be easier to use than the original ComputerEyes, and the images are even better. By the way, the price is the same as that of the original ComputerEyes, which means it's still a best buy.

Fontrix Users, Take Note

We've received inquiries about using Fontrix with the Apple IIGS or the ImageWriter II. If you're using these products, you need Fontrix Version 1.55. You can upgrade to this version by sending Data Transforms your original Fontrix program disk and $10.

Watch for Data Transforms' new product for the Apple II family, Printrix. This software package lets you "typeset" your text files from word-processing programs in Fontrix fonts, with graphics merged into the text. We'll tell you more about Printrix after we've tried it.

Programmers' Delight

For those of you who are serious graphics hackers/tinkerers, Polarware is offering The Graphics Magician PICDRAW Developer Package, an update of the picture/object editor of the Graphics Magician. As the name implies, the Developer Package is intended for programmers and is, according to Polarware, "not likely to be a 'retail store' product." The existing retail Graphics Magician package works only with hi res and double hi res. This version has been revised to run under ProDOS and works with hi res, double hi res, and, soon, super hi res with one module.

If you're not familiar with the picture/object editor of the Graphics Magician, the program creates what computer-graphics professionals call a display list. As you draw, the program remembers the moves you make and the commands you give to create a graphic. Unlike a recalled image from a standard paint program, which just appears, a Graphics Magician picture/object-editor image is redrawn right before your eyes. PICDRAW recreates each and every one of your moves and commands. If you're clever and patient, you can take advantage of this feature and incorporate limited animation into your graphic.

PICDRAW images can easily move from one brand of computer to another with only minor changes.

PICDRAW graphics are popular for use in educational software and adventure games for two primary reasons. First, these images take up much less disk space than standard or even compressed pictures. Second, because they're stored as display lists rather than bit maps, PICDRAW images can easily move from one brand of computer to another with only minor changes to accommodate different resolutions and color availability.

Polarware also offers editors so that you can convert to other brands of computers. If you're developing graphics or programs for the educational or entertainment market, you may want to check out the PICDRAW Developer's Package. To use this product in a commercial application, you'll have to license it from Polarware.

Long Live Ceemac!

We recently received a letter from Brooke Boering, creator of the interactive-graphics programming language Ceemac, the language of Fire Organ. Fire Organ, available in many public-domain libraries, astounds everyone. Each key on the Apple keyboard generates a different rapidly moving graphic, and most of them are beautifully symmetrical. Nothing we've ever seen compares to it. Fire Organ was intended to entice people to buy Ceemac so that they too could create new "scores" (as Ceemac programs are called).

Programming in Ceemac is not everyone's cup of tea. Ceemac is, like the displays it produces, eccentric but fun. Over the last several years, Boering has marketed, sold, duplicated, packaged, and mailed Ceemac to anyone enraptured enough by Fire Organ to want to give it a try.

Now, he's put versions of Ceemac up to 1.6 and its companion tool, Maestro, into the public domain. We expect it to appear in the major public-domain and users'-group libraries soon. Along with the language, you'll get the source code of the Fire Organ scores so that you can modify and refine the ones you like. At $75, Ceemac was a bargain; now that it will cost you only what your users' group charges for a disk, you've no excuse. Give Ceemac a try!

That's all for now. See you next month. ✚

PRODUCT INFORMATION

Ceemac and **Maestro**
Brooke Boering
Public-domain software available through users' groups
Requires: Apple II Plus, IIe, or IIGS; 48K RAM; 5¼-inch disk drive. Not copy-protected; does not work with mouse.

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ComputerEyes/2
Digital Vision, Inc.
14 Oak Street, Suite 2
Needham, MA 02192
(617) 444-7160
List Price: $129.95; with black-and-white video camera, $459.95; enhancement software, $24.95
Requires: Apple II Plus, IIe, or IIGS; 64K RAM; one 5¼-inch floppy-disk drive; video source such as a camera, VCR, or videodisc player. DOS 3.3 or ProDOS

CIRCLE 352 ON READER SERVICE CARD

Fontrix 1.55
Data Transforms
616 Washington Street
Denver, CO 80203
(303) 832-1501
List Price: Fontrix 1.55, $95; upgrade, $10

CIRCLE 353 ON READER SERVICE CARD

The Graphics Magician
PICDRAW Developer Package
Polarware
Attention: Jeffrey Jay
521 Hamilton, Box 311
Geneva, IL 60134
(800) 323-0884
List Price: $95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one 5¼-inch disk drive. Not copy protected; does not work with mouse. ProDOS 8

CIRCLE 354 ON READER SERVICE CARD

Fresh Ideas

Open-Apple is Tom Weishaar's monthly newsletter for knowledgeable Apple II users. It's thin but packed tight with Apple II lore, humor, letters, tips, advice, and solutions to *your* problems. Compared to other Apple II publications, ***Open-Apple*** has the highest new-idea-per-issue ratio, the clearest writing, the funniest cartoons, the longest index, the *only* warranty (all your money back if you're not satisfied), and it takes up the least shelf space. The only thing it doesn't have is the most subscribers. Yet.

II-cue #4

On some Apple IIs, ProDOS 1.1.1 will, in unusual circumstances, destroy the catalog track on your disks. To protect against this:

```
BLOAD PRODOS,A$2000,TSYS
POKE 22211,189 : POKE 22214,189
POKE 22217,189 : POKE 22220,189
POKE 20484,189 : POKE 20485,142
POKE 20486,192
BSAVE PRODOS,A$2000,TSYS
```

For complete information on how this patch works and where it came from, see "ProDOS bug found in Australia," in the November 1986 ***Open-Apple***, pages 2.73-74.

From our fan mail:

"The AppleWorks rescue routine you published (June 1986, page 2.33) was worth the price of a year's subscription. My son had spent about six hours working on a school paper and when he went to print it the computer froze. We pushed control-reset and then used the rescue steps and were able to save the homework and print it out later."

E.H. Parker, Jr., MD
Walla Walla, Wash.

"Your newsletter is probably the most informative, easy to read Apple II publication I've seen."

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APO New York

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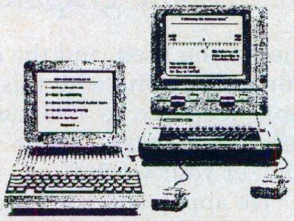

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Expert Opinions

Nibble magazine says, "This program should be in the library of every Apple user". Howard Sams Tech Manual, Apple Orchard, InCider Popular Computing, and the Apple II Review have all awarded Master Diagnostics with triple AAA ratings. *Consumers Guide chose Master Diagnostics as one of the best programs for 1985.* Used by Apple service centers world-wide.

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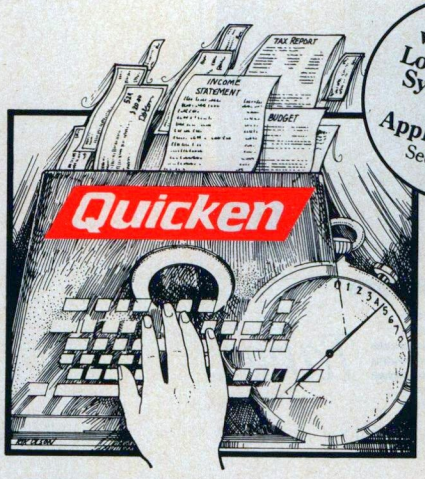

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—Ken Landis, A+ Magazine

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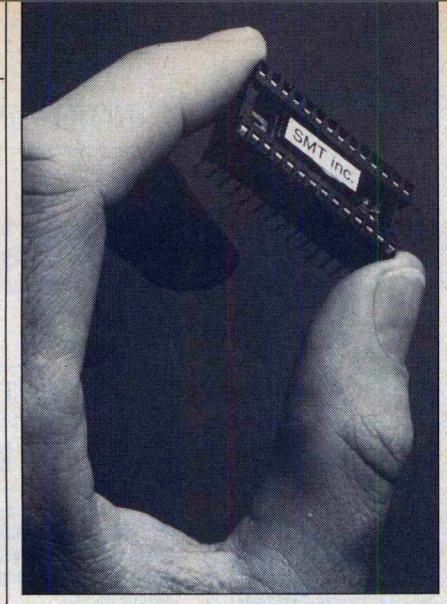

Quick Take

BY KEN LANDIS

No-Slot-Clock

Much to Apple's credit, it has listened to its customers' needs and wants for the Apple IIe and has incorporated much of this feedback into the computer. Unfortunately, it hasn't heard the cries for a built-in clock, so a new mini-industry has surfaced to produce Apple IIe clocks. One of the latest entrants into the IIe clock market is Systems Manufacturing Technology, Inc. (SMT) of San Marcos, California, with its product the No-Slot-Clock.

SMT recognized not only that a demand existed for IIe clocks but also that Apple IIe owners were slot-crazy—they would fill all the available expansion slots in their machines. SMT reasoned that if it could provide a IIe clock without taking up a slot, it would attract IIe owners who were slot-broke and those who were afraid of becoming so.

Great idea, and a great product. The basis of the SMT No-Slot-Clock is a custom-packaged ROM chip that replaces the "CD ROM" chip on the IIe's motherboard. The SMT chip handles the customary CD ROM functions as well as providing a real-time clock and lithium battery backup, all in a nice package that looks like a thick ROM chip.

A custom-packaged ROM chip that acts just like a slot clock

SMT recommends that unless you feel comfortable fiddling around inside your IIe, you pay your dealer to install the No-Slot-Clock chip. With labor, then, this $59 clock now costs about $100 for all but the electromechanically inclined.

Once the clock is installed, using it is a breeze. The No-Slot-Clock comes with a utility disk that works with both DOS 3.3 and ProDOS. You use the utility programs on it to set the clock, to patch AppleWorks and/or ProDOS to use the clock automatically, and for writing your own programs to take advantage of the clock.

The Setclock utility is simple. You supply the present time in 24-hour format (6 P.M. is 1800, for example) and press Return. That's all it takes. You need to use Setclock only when you first install your clock and for changing it to and from daylight saving time.

The Install patching programs are also easy to use. You boot your IIe from a system disk and then run the Install utility. The operating system then changes to recognize the clock and is saved back to the system disk. Once the patching is complete, the computer automatically stamps all files with the date and time.

The two programs that come on the No-Slot-Clock utility disk for programmers are Clockread and Clockwrite. Clockread is a binary file that any BASIC program can call or relocate. Once the binary program is loaded, the clock places the year, month, day, day of the week, hour, minute, second, and hundredth of a second at the eight addresses beginning with the address where the program was loaded plus 3. You extract these values with a peek.

Clockwrite works almost the same way. After you've loaded the binary program, a poke sets the same eight values that Clockread read. A call to Clockwrite permanently resets the clock to the values that you poked into memory.

SMT has done an excellent job of developing a useful product for IIe owners. The No-Slot-Clock appears to have high standards of manufacturing and quality control and is easy to install and use. Why use a slot when you can use a No-Slot-Clock? +

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ENTERTAINMENT

GAMEPORT

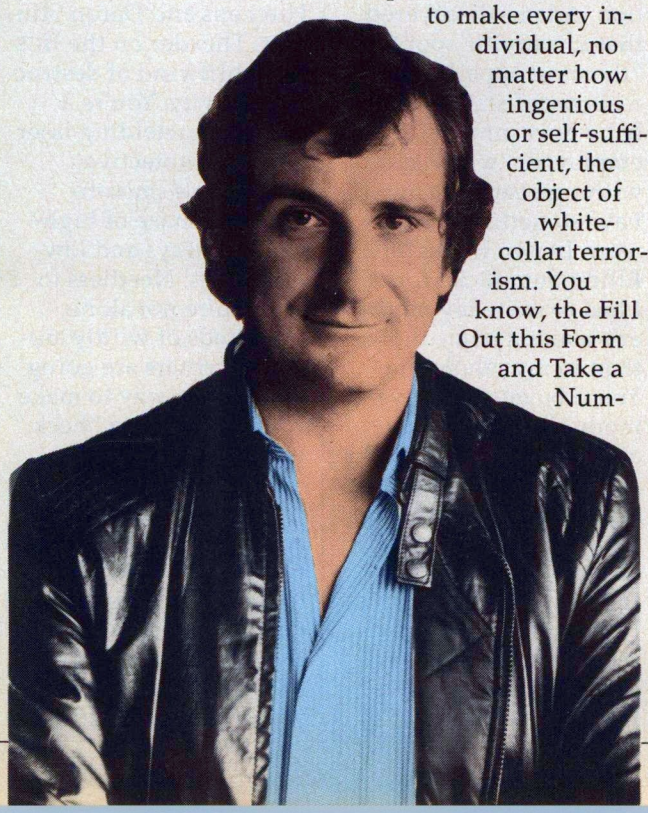
BY BOB LINDSTROM

Douglas Adams' new text adventure, Bureaucracy, from Infocom; Sierra On-Line's Thexder for the IIGS; and game techniques from all over the world.

WHITE-COLLAR TERRORISM

Don't mistake Douglas Adams for a wimpy kind of guy who wanders around the universe in his bathrobe. Adams may be the author of the elegantly demented book, radio program, television series, and (with Steve Meretzky) computer adventure game The Hitchhiker's Guide to the Galaxy, but he isn't at all like its hapless technovictim, Arthur Dent. Adams is a tall, robust, outgoing fellow who seems impossible to victimize.

Don't bet on it. As we reach the end of the 20th century, our technological power has enabled us to make every individual, no matter how ingenious or self-sufficient, the object of white-collar terrorism. You know, the Fill Out this Form and Take a Number syndrome. To paraphrase the late Andy Warhol, "In the future, everyone will be a victim for 15 minutes."



Does that sound a little paranoid? Fine. So does Bureaucracy, Adams' new text adventure for Infocom.

Is it a game or just an incredible simulation? You be the judge. In Bureaucracy, you've just been promoted to a new job and relocated to a beautiful new home, and you've accepted an offer to attend a training seminar in Paris. Sounds great, right?

Oops. The bank, that officeful of cold-eyed executives with their icy fists around your money, hasn't received your change-of-address form. You can't get your money. Sure, your check is in the mail, but the mail is going to the old address. You can't take a cab to the airport because you can't pay the driver. But that's OK, because you don't have your tickets.

Scream now. Loudly.

Like all industrial-strength nightmares, Bureaucracy is based on reality. "It was when I moved to my current London apartment," Adams explained during an interview at the Software Publishers Association Symposium last March.

We were sitting on a park bench in the gleaming California sun. Nothing could be more removed from the sterile desktops where squinting bureaucrats were keying white-collar terrorism into their PCs. And yet, as we chatted, a three-man team appeared, ceremoniously uncoiled a garden hose, sprayed water for three pointless minutes (some of it dampening the automatic sprinkler system installed in the grass), and walked away. Apparently, someone had delivered the Water the Grass form to the maintenance department.

Adams' London move took place without any apparent problems, but his bank didn't seem to know about it. "I had gotten a loan from the bank to make the move," Adams said. "They must have known I moved; they paid for it." The bank hadn't received Adams' change-of-address form. Why? Because it had been sent to the old address.

Several frustrating

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GAMEPORT

phone calls later, Adams made his new location known to the bank. In an effort to redeem themselves, sooth raw nerves, and assure Adams that the matter was solved, the bank sent a humble letter of apology. To the old address.

With Adams' errant imagination at work, the perils of Bureaucracy eventually carry you to a remote tropical island. This part, too, was based

Is Bureaucracy a game or just an incredible simulation? You be the judge.

on personal experience.

On a trip to Madagascar on behalf of the World Wildlife Foundation, Adams discovered that this idyllic spot had "the most appalling bureaucracy," staffed largely by government employees "who have nothing else to do but have something green to wear. In two weeks [of filling out official forms], I had to write my mother's maiden name more than in my whole life." You'll be muttering your mother's maiden name after a few hours with Bureaucracy. And laughing too. Adams' wit tempers the frustration of this clever adventure. Still, the man has an officiously evil imagination. I can see bureaucrats themselves getting pointers from Bureaucracy.

IIGS OWNERS, PREPARE TO FIRE

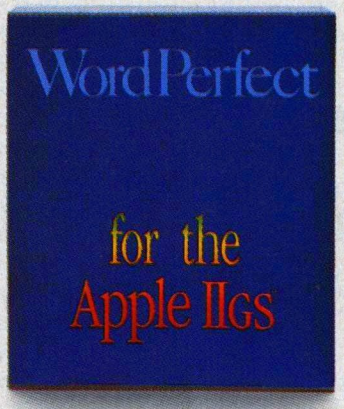
Great graphics, incredible sound, and now rapid-fire animation—the Apple IIGS finally caters to game players' deepest fly-and-shoot instincts with the summer release of Sierra On-Line's Thexder.

Since the IIGS has somewhat fewer animation capabilities than Apple IIe and IIc computers, programmer Mike Branham of Synergistic Software has worked a minor miracle in creating the IIGS version of the popular Japanese computer game designed by H. Godai and S. Uesara of Game Arts.

With some secret programming techniques that Branham has devised with colleagues Garth Hitchens and Daron Stinnett, Thexder on the IIGS is a whirlwind of destructive activity. You're a spaceman wielding laser gun and protective shields in a smooth-scrolling maze of high-tech hallways and low-tech caves. Needless to say, you're not alone. Hundreds of wildly animated critters are going out of their way to make your life a living "heck." It is of true quarter-munching arcade quality.

The folks at Sierra discovered Thexder during a trip to Japan. According to John Williams of Sierra On-Line, until recently the graphics capabilities of Japanese computers were far superior to those

If you want power from your IIGS, WordPerfect gives it to you in writing.



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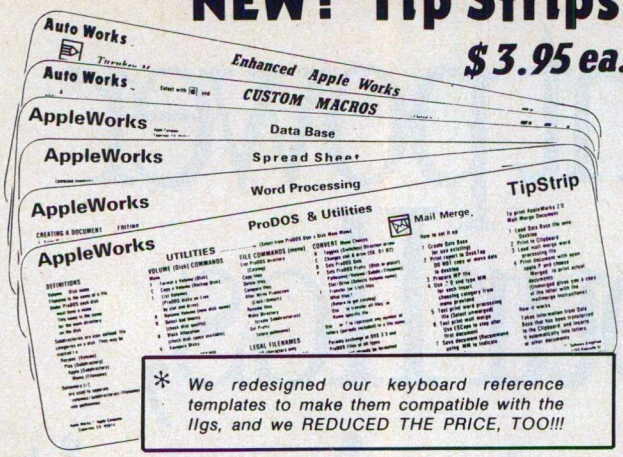

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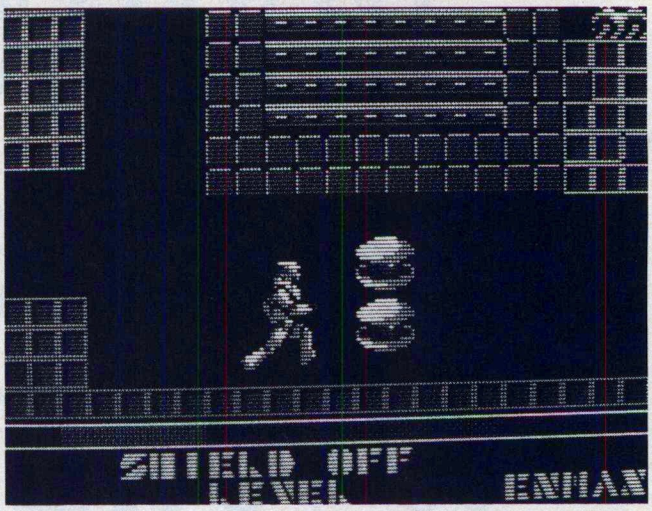


of their American counterparts. "They had to be, in order to reproduce Japanese characters," Williams explains. At the same time, those flashy pictures made "their arcade games much more fun than ours ever were," says Williams.

Because they relied heavily on the superiority of Japanese computer graphics, Japanese computer games were difficult to bring to these shores. With the new pictorial prowess of computers such as the IIGS, however, America is back in the games race. "I think in the next year you'll see lots of Japanese games converted to computers such as the IIGS," Williams concludes.

So let's hear it for the red, white, and blue . . . and puce and purple and teal and the thousands of other colors, not to mention the high-resolution graphics, of the Apple IIGS. We're helping keep America at the forefront of international game technology. Ron must be so proud.

GLOBAL GAMEPORT TO THE RESCUE

"Bringing you game techniques from the four corners of the globe—the thrill of extra points and the agony of rebooting—it's the Wide World of 'GamePort.' " The play tips have been coming in from around the world. I offer another hearty thanks to "GamePort" readers for their contributions and pass on a few more to you.

Carlos Tang sent tips all the way from Panama. "In Miner 2049er, if you want to start with a different level (1 to 8), when the computer asks you if it's one player or two, press SHIFT and the number of the level you want to play." Thank you, Carlos, for signing in from Central America and for calling *A+* "the greatest magazine of all time." Some guys really know how to get mentioned in a magazine.

From the northland,

GAMEPORT

Bringing you the thrill of extra points and the agony of rebooting . . .

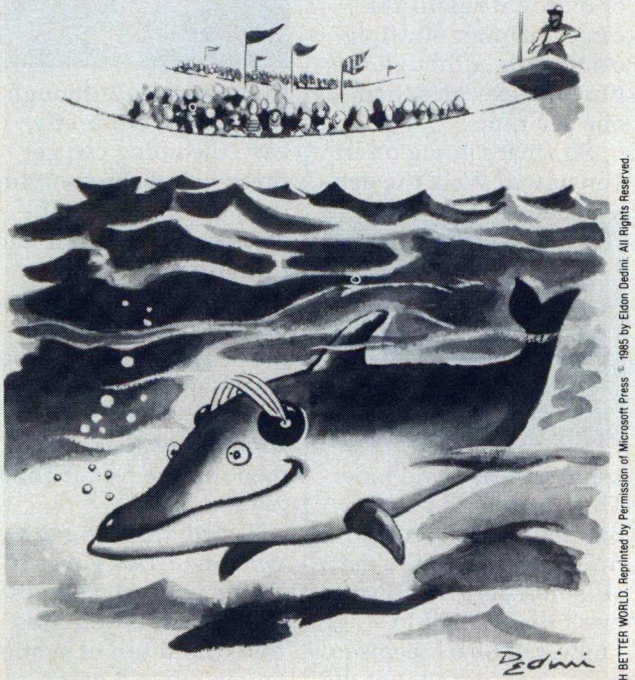
Marc Bradley of Eagle River, Alaska, has a suggestion for Sea Dragon, which is being rereleased by Thunder Mountain Software. "Hit Control-J before you start the game. You get 9999 of air instead of the normal 6000."

It's a small world, after all. While you're reading this column, it's possible that Aaron Demello is also reading it in Hawalli, Kuwait. He explains that in Datasoft's Bruce Lee "You can get points in the first screen by exiting it and returning. Then, move three steps to the left, press the fire button, and hold it down. When the Ninja and Sumo appear, they will be killed immediately, and you will gain lots of points."

Getting a little closer to home, Ed Chen of Reno, Nevada, suggests committing suicide in level one of Brøderbund's Championship Lode Runner by pressing Control-A. "You will appear on Championship Lode Runner's first level, and you can flip through it" by using Control-Shift-6 and get more men by pushing Control-2. +

BY DEDINI

LAUGHTRACK



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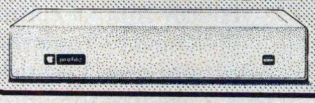

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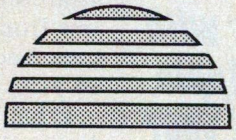

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ENTERTAIN

This month's games challenge you to rescue Gramps from the wild denizens of Tonetown, refight the Civil War with your Apple, or fulfill your many quests in the Land of Varn.

WHERE'S GRAMPS?

Oh, that Gramps. There he goes again. He's disappeared into an electrically charged hoop and ended up who-knows-where? What are you going to do with a Gramps like that?

Follow him, of course.

Welcome to Tonetown, a brilliant new dimension that looks like something Steven Spielberg might have created using Hollywood Blvd. as a model. I mean, silver hairstyles and TroppoWear jumpsuits, hooplets—and guitar picks as legal tender?

What, you don't understand a word I've said? Don't worry. It grows on you. Tonetown is pretty strange, but that's what makes it interesting. I mean, where else could your faithful dog, Spot, become a living legend called Ennio? Good thing he likes you, because he can be a pretty good guide in the new environment.

Did I mention that Tass Times in Tonetown is a colorful graphic adventure game for Apple II-series computers? Well, now you know. You can use a mouse or joystick, type in commands, or select from icons representing various commands. You can pick up an object by clicking on it or pressing a joystick button. It goes into the inventory box, which always displays what you are carrying. To drop it, you click or button it again. You can even enter multiple commands, although the program executes them one at a time.

So what's going on in Tonetown? Well, the denizens are tass—and tone. They are a wild bunch, but not all of them are nice. Franklin Snarl, part alligator, part—well you don't really want to know, but Snarl seems to be taking over a lot of the downtown businesses, and it looks like he's done something with Gramps.

You read all about it in the *Tonetown Times*. In fact, you can learn a lot from the *Times* (you get an informative issue with the game).

It's a good thing you can save yourself by saving your game. You can save up to ten games in progress or use Quicksave to save at any point (then, if you die—and you will, often—you can type Quickload to return to the game where you were before). I say it's a good thing because, although things start out pretty easy, the going can get pretty tough, and solving the puzzles can get increasingly hard. You start thinking like a Tonetowner, or you won't figure out how to use the materials on hand to your advantage. And if you don't do it right, you and Gramps are sunk, not to mention the rest of Tonetown.

Graphically, the IIGS version of Tass Times in Tonetown really shines. It is brilliant, well illustrated, and full of subtle animation and graphics—a good omen for IIGS things-to-come—not just a straight port from the II

MENT REVIEWS

version but an original set of graphics. Game play and plot are the same in all versions, however. Sound effects, although used sparingly, are also impressive on the IIGS and less so on the other Apple II computers.

Even more impressive, and entertaining, is the music. The IIGS version plays some mean rock at the beginning and later in the game.

Tass Times in Tonetown can be deceptive. It starts out looking pretty easy, but it rapidly grows difficult. Interacting with the locals can yield some interesting revelations and cryptic dialogue. You grow used to the Tonetown vernacular in time, but you may not want to live there.

If you have a IIGS, this program is a must. If you have another Apple II-series computer, the game still is good, but don't compare it graphically to the IIGS version, or you'll be disappointed. In fact, it isn't really fair to lump these two versions of the same program together, but there you have it. Stay tone.

Rusel DeMaria

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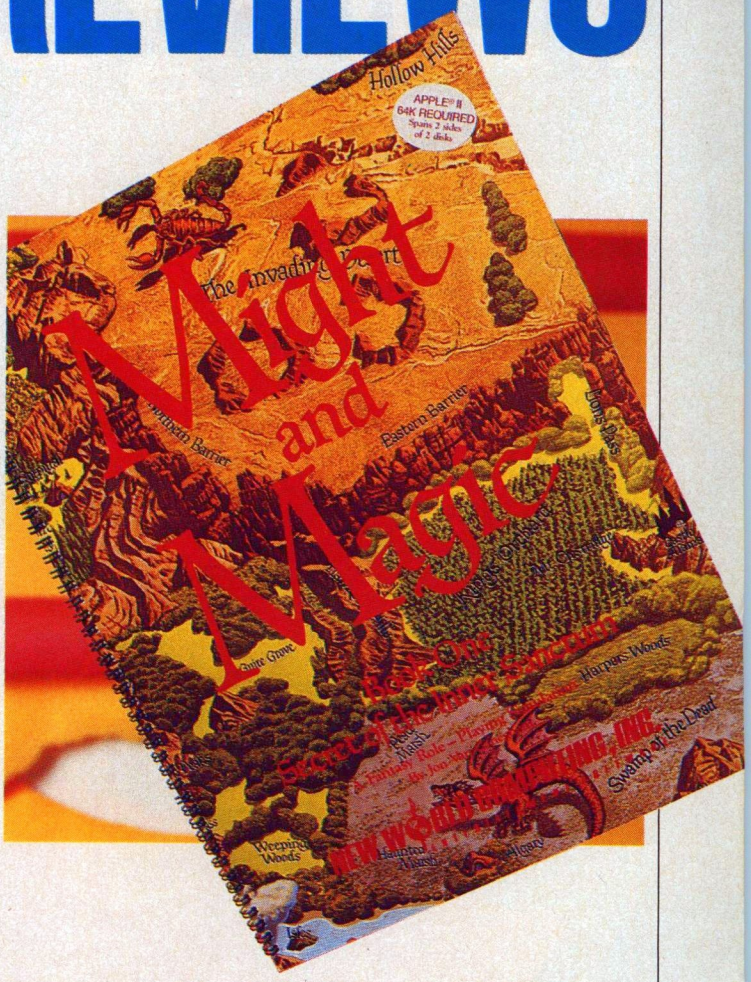

THE BLUE AND THE GREY ON THE BEIGE

The box proudly proclaims, "The only thing we've left out is the snap of the Battle Flags and the smell of blackpowder on the breeze." Blue Powder Grey Smoke, a tactical Civil War game, holds so much detail and realism you will quickly find yourself wondering if you've stepped into a time warp to the battlefields of Antietam, Gettysburg, and Chickamauga.

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REVIEWS

point A to point B and setting up firing orders, you still must consider other aspects of leading troops. Each unit has three values: a command level that runs the "full spectrum from military genius to the criminally incompetent"; a morale level that "measures how much confusion, noise, and fear the men will endure"; and a fatigue level that tells you how tired the men are. Push a unit too far and too fast, and it routs. I hope you remember this information. If you do, you are promoted to captain.

Now, just moving the right troops in the right way is not enough. You must make sure they have the right weapons. Blue Powder Grey Smoke offers five types of small arms and four types of artillery. The firepower for each type is rated by range, which is divided into close, normal, and long. Finally, unlimited ammunition is a thing of arcade shoot-'em-ups, not Civil War battles, so units may make only a limited number of attacks before running out of ammunition. They may, however, scavenge from the battlefield casualties for more. Learn this fact, and you are promoted to major.

The game includes 11 types of battlefield terrain, all of which can be mixed and matched. The line-of-sight feature allows you to hide a unit in woods and ambush passing enemy units or march past an enemy on the other side of the hill. Add visibility and movement restrictions from the four seasons and three times of day, and you have just about every element for a battle. If you still follow me, you are promoted to colonel.

If you can put this all together into a cohesive strategy and win one of the nine scenarios, you are promoted to general.

To make all these options available, programmer Ralph Bosson built the game around nested menus. You use the joystick to cycle through the

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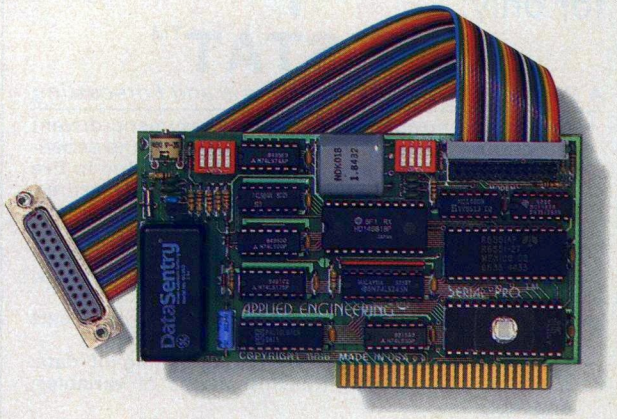

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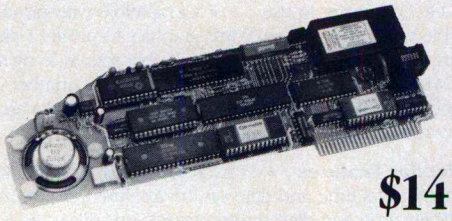

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choices and select the option you want. This method is probably the best way to offer all those choices, but frankly, I find these controls too repetitious to want to exert personal command over every unit.

The game uses a real-time mode, which means it does not divide into game turns. Thus, as you give orders to the brigade on the right flank, your left flank also carries out your orders, if any. This simultaneity forces you, like a real commander, to keep in touch with all your units at all times while being in only one place at a time. Furthermore, even though you issue orders to a unit, it takes time for the orders to get there—and even then, depending on the command rating, the unit may not do what you want it to do. Finally, the enemy has a thing or two to say about how your units move and fight.

The result is a free-wheeling battle with shot and shell, confusion and illusion, and charge and countercharge.

The three-dimensional graphics can be disconcerting at first, as you try to figure out where you are in relation to the terrain. A neat Zoom feature lets you view the battle up close and personal.

Blue Powder Grey Smoke can be overwhelming. My head ached almost as much as my wrist by the time I got to the cornfields of Antietam. At the risk of incurring the wrath of diehard

war-game veterans, I'd like to see a simpler version. Cutting down choices would speed up game play. Adding them in later would provide the rich, historical flavor.

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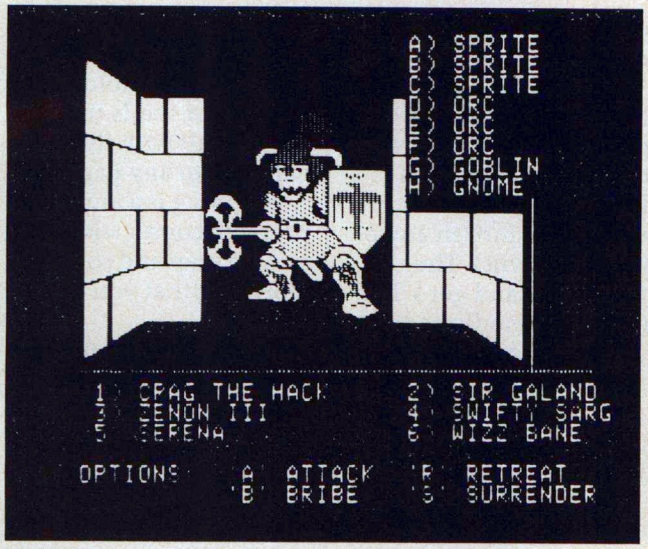
A SWORD BY ANY OTHER NAME

O denizens of the dank and dripping halls and dungeons of Wizardry, hark! Thy time is nigh. For into the world is born a challenger great and valiant. A sequel, thou asketh? Nay, but an original and worthy pretender to the title King of the Role Players. 'Tis Might and Magic, the brain-childe of one Jon Van Caneghem (aka New World Computing, Inc.).

REVIEWS



OK. Enough vernacular. Swords and Sorcery/Might and Magic—a synonymous pair if I've ever seen one. And Might and Magic is swords and sorcery to the max! Believe me, if you're a Wizardry addict hungering for more, this is the program for you.

Statistically speaking, Might and Magic is impressive. The Land of Varn boasts 5 towns, 6 castles, 9 caves, 20 outdoor regions, 13 dungeon levels, an astral plane, and a soul maze. Each area is in a 15 × 15 grid. If you count well, you'll realize that there are 55 separate areas. The original Wizardry had only 10 dungeon levels.

More numbers: 255 unique items, many with magical powers; more than 200 monsters (where would we be without a full complement of demons, devils, and Pegasuses? You'll find treasure in abundance in sacks and boxes of varying value. For instance, a wooden box is of only moderate interest, but a silver or gold box is sure to yield some great goodies. And a black box—you'll have to earn one of those to find out what's within.

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Spells? You like spells? We've got spells—94 of them, 7 levels of spells to earn. Many spells require the use of gems that you find here and there in the Land of Varn. Other spells vary in power with the experience level of the spellcaster. As usual, you have to gain considerable experience to use the more powerful spells.

And that brings me to characters. You can create up to 18 characters on a single data disk, but you

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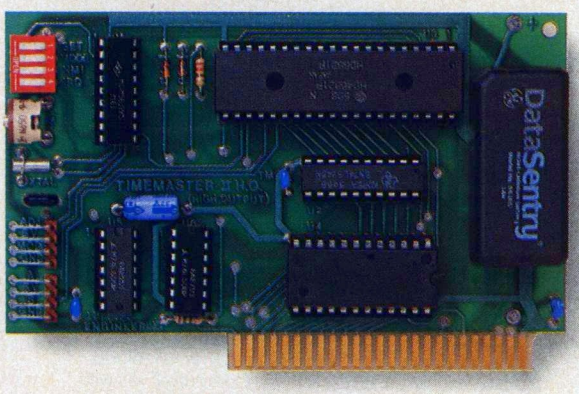

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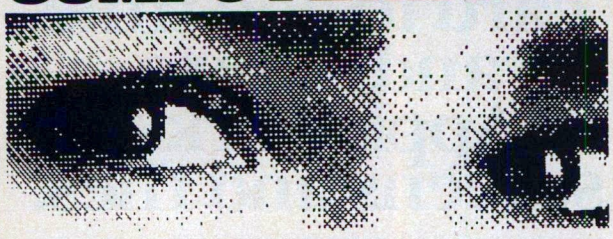

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can create as many data disks as you wish.

One of the nicer features of the program is that you can always recover your characters from the last time they entered an inn (in any of the five towns). Thus, if you go out and get killed (or worse, eradicated), you can always start over right away—you just lose anything you've acquired on the outing in which you died.

Visually, the game is excellent. All areas in Might and Magic contain 3-D graphics and perspective, and each move updates the screen instantly—no waiting for the screen to refresh. Monsters appear as a variety of colorful images, and other visual surprises await your discovery.

Commands are simple and basically to the point. They include movement commands, Order, and Rest (to rest the party—restores spell points and hit points and requires one ration of food per party member). The Rest command deserves praise. No longer can you be on a long and important mission only to run out of spell points too soon. Now, as long as you have food, you can replace lost hit points and spell points. Rest also cures some negative conditions.

The game comes with a well-written manual. It is concise and informative and doesn't take hours to read. In addition, you get an excellent full-color foldout map of the Land of Varn, showing many of the key locations. On the back of the foldout is a listing of spells that you can consult with the manual open to any page.

Mapping is a must. The program comes with a sample map and some templates that you can copy.

A lot of facts make up a game such as Might and Magic, and I could go on and on describing its unique aspects, but something intangible makes it work.

Like Wizardry, Might and Magic contains the tremendous effort and imagination of someone who really loved what he was doing, and it shows. My only regret is that I haven't had enough time to play the game over and over, day after day. For a while there, I did play Might and Magic every spare moment. I still have much more to see, and I look forward to it.

If you enjoy role-playing games, you'll certainly love this one. If you've never tried one, you could ask for no better introduction than Might and Magic. Want a hint? Don't ever bother a group of dragons in conference. They can be nasty.

Rusel De Maria

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BY MICHAEL WIESENBERG

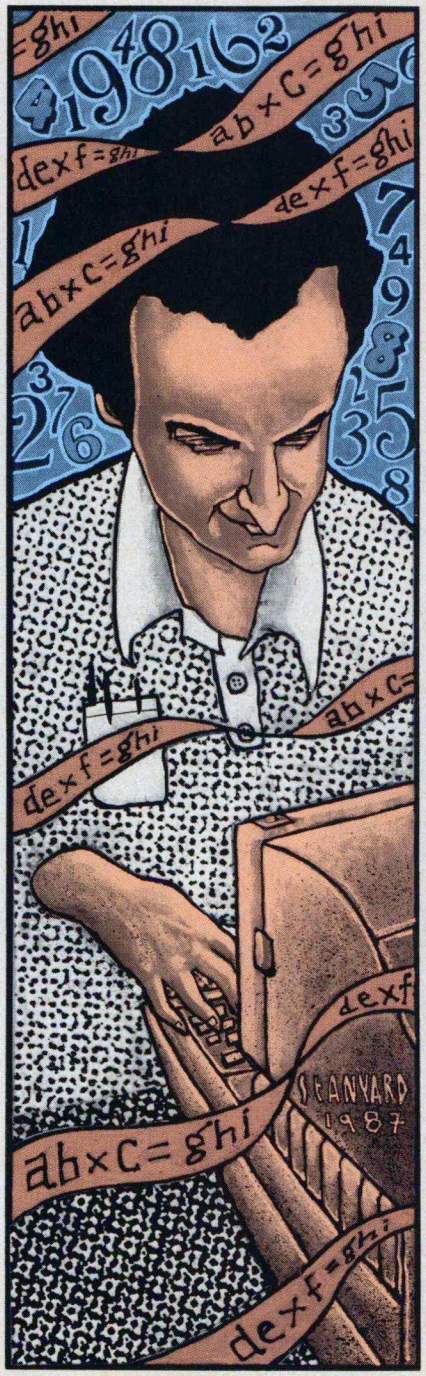
MORE MULTIDIGIT MULTIPLICATION MYSTIFICATION

Looking for another expression containing the numbers 1–9

Continuing with numeric expressions that involve one each of the digits 1 through 9, can you replace the digits in the expression $ab \times c = de \times f = ghi$? Each digit is represented by a letter, so this puzzle asks what two-digit number multiplied by what one-digit number produces the same three-digit product as what two-digit number multiplied by what other one-digit number? In this case, the nine digits are spread throughout the three parts of the expression. (Last time I didn't specify the product.) The best solution to this one will be the most efficient and the fastest executing (taking the language into allowance).

Send a complete program. Be sure to include sample output and running time. If you send a diskette, please also enclose hard copy. Your program must be short; elegant; and, if not self-documenting, accompanied by a good, concise explication. The best solution wins a one-year subscription (or extension) to *A+* and a Certificate of Excellence in Programming and will be published here.

Please send all entries, which must be received by July 10, 1987, to Computer Calisthenics, Box 2329, Stanford, CA 94305. Please send entries by regular mail only. The author does not receive in time any mail for which he must sign. All entries become the property of the author. The winner will be selected by the author, whose decision will be final. The winning program will be announced in the August 1987 issue of *A+*.



Answer to April's Puzzle

April's puzzle states that you can form an infinitely large number by writing successively all the integers beginning with 1 in this form: 12345678910111213141516... and then asks what digit occupies the one millionth position, how many digits are in the integer formed in that position, what position it occupies in the total number of integers with that many digits, and what position the digit in question occupies within that integer. By the way, no one faulted me on this, but, just to set the record straight, that's not actually a *number* being formed; it's an infinite series.

It seems *A+* has many clever readers. I got a *lot* of entries this time—including some from as far away as Egypt, Australia, and Mexico—and 95% of them had the correct solution, making my job of choosing a winner very difficult. I made my choice by considering programs that added little niceties. Many programs printed, for example

```
The 333th digit is 7.
It is the 3th digit in the 48th 3-digit
number.
```

That's the right answer, but it would have been a nice touch if it had printed the correct suffix for ordinal numbers. Also, I didn't ask for the actual integer within which the millionth digit is found, but several entrants supplied it anyway. Many entries were not adequately documented, and many

ILLUSTRATION BY STEWART STANYARD

APRIL'S WINNER

```
1 REM       <Problem>:  An infinitely large number (N) is formed by
2 REM       successively writing integers (1 2 3 4 5 6 7 8 9 10 11 ...).
3 REM       Given an input (P), find:
4 REM       D: The digit that corresponds to the P'th digit in N.
5 REM       I: The integer in which D is located.
6 REM       J: The number of digits in I.
7 REM       K: The digit position in I that D occupies.
8 REM       L: The position I occupies in the total number of
9 REM       J-digit integers.
99  REM     Function to remove all but the rightmost digit from integer.
100 DEF FN TRC(A) = A - INT(A / 10) * 10
110 S$ = "thstndrdthththththth" : REM Suffixes.
120 INPUT "Input a number: "; P
130 SUM = 0 : REM Number of digits in N before the first J-digit integer.
140 J = 1 : REM Initialize.
150 TEST = 9 * 10 ^ (J - 1) * J : REM Number of digits in J-digit integers.
160 IF SUM + TEST >= P THEN 180
170 SUM = SUM + TEST : J = J + 1 : GOTO 150
180 L = INT ((P - SUM) / J + .999999999#) : REM Rounded up.
190 K = INT (P - SUM - (L - 1) * J + .5) : REM Rounded.
200 I = 10 ^ (J - 1) - 1 + L
210 D = FN TRC ( INT (I / 10 ^ (J - K)))
219 REM     Output answers with suffixes as appropriate.
220 X = INT((P - INT(P / 100) * 100) / 10) : REM Isolate next to last digit.
230 PRINT : PRINT "The ";
240 PRINT P; MID$ (S$, FN TRC(P) * 2 * ABS((P < 10 OR P > 19) AND X <> 1) ;
250 X = INT((K - INT(K / 100) * 100) / 10) : REM Isolate next to last digit.
260 PRINT " digit is"; D ; " and": PRINT "it is the ";
270 PRINT K; MID$ (S$, FN TRC(K) * 2 * ABS((K < 10 OR K > 19) AND X <> 1) + 1,2;
280 PRINT " digit of the ";
290 X = INT((L - INT(L / 100) * 100) / 10) : REM Isolate next to last digit.
300 PRINT L; MID$ (S$, FN TRC(L) * 2 * ABS((L < 10 OR L > 19) AND X <> 1) + 1,2;
310 PRINT " "; J ; "-digit integer ("; I ; ")."

Input a number: 1000000

The 1000000th digit is 1 and
it is the 1st digit of the 85186th 6-digit integer (185185).
```

programs were too long. I don't know whether this puzzle particularly lends itself to solution in BASIC or whether the Pascal and C entrants were just too wordy, but most of the non-BASIC entries exceeded one page.

With all that in mind, I chose Bob Velke of Annandale, Virginia, as the April winner.

His BASIC program doesn't require much extra explanation. There are 9 1-digit numbers in the series, 90 2-digit numbers (from 10 to 99), 900 3-digit numbers, and so on. Each set of *n*-digit numbers contains $9 \times 10^{n-1}$ members.

In line 180, Velke uses a mechanism to guarantee that an expression finds the next *larger* integer. It also helps eliminate floating-point round-off errors.

I added two things to his program. One makes it more portable. In AppleSoft BASIC, *TRUE* is +1, and *FALSE* is 0. *FALSE* is usually 0 in any version of BASIC, but *TRUE* is -1 in some. Statements 240, 270, and 290 depend on an expression, for example, *(P < 10 OR P > 19) AND X <> 130*, evaluating to +1 or 0. That works in AppleSoft. Using *ABS* guarantees that it works in other versions of BASIC.

The other thing I added was an improvement on his suffix-determining mechanism. What Velke originally had was

```
240 PRINT P; MID$ (S$, FN TRC(P)*2*
    (P ( 10 OR P ) 19) + 1,2);
```

That works fine for all numbers except those greater than 100 whose next-to-last digit is a 1. For a number such as 111, it produced this:

```
The 111st digit is 1
```

I would not have given Velke this "help," except that no one else with an otherwise acceptable program accounted for such numbers either.

I added statements 220, 250, and 290, and changed his test to

```
240 PRINT P; MID$ (S$, FN TRC(P)*2*
    ABS((P ( 10 OR P ) 19) AND X () 1) ;
```

Following Velke's program is a run with the answer. ✚

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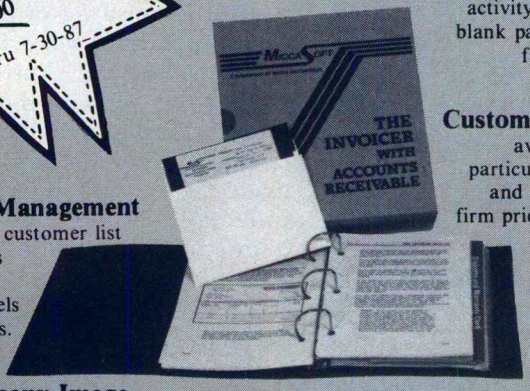

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Readers share tips for the II

PASSWORD

The program below lets you keep others out of the programs and files on your DOS 3.3 disk. Use POKE 21503,0 ("Tips and Techniques," *A+*, March 1987, p. 115) to disable the catalog on a DOS 3.3 disk if the password is not correct. To change the password, change lines 30, 40, and 55 from TRIPLE BOGIE to the password desired. Just save it under the boot program's name.

Mike Horak
Owosso, MI

```
10  HOME : PRINT "WHAT IS THE CODE
    WORD?"
20  INPUT A$
30  HOME : IF A$ < > "TRIPLE BOGIE"
    THEN  POKE  - 21503,0
40  IF A$ = "TRIPLE BOGIE" THEN
    PRINT "HELLO MIKE"
50  PRINT : PRINT : PRINT : PRINT :
    PRINT : PRINT : PRINT
55  IF A$ <  > "TRIPLE BOGIE" THEN
    ONERR  GOTO 70
60  PRINT  CHR$ (4);"CATALOG"
70  NEW
```

IIGS ON-SCREEN CLOCK

The following utility program reads the IIGS clock and puts the time and date in variable T$, which you can display or manipulate by using MID$, LEFT$, etc. Other strings can be concatenated with T$. Just don't try to redefine T$, and be sure that it's the first statement in your program. If you run the program, this statement won't look right because it now holds the time/date last displayed, which tokenizes into Applesoft commands such as COLOR=. You can also

```
10 T$ = "MO/DY/YR HR/MI/SE SM": HOME
   : FOR I = 0 TO 19: READ J: POKE
   768 + I,J: NEXT : DATA 24,251,
   194,48,244,0,0,244,9, 8,162,3,
   15,34,0,0,225,56,251,96
20  CALL 768: VTAB 5: HTAB 5: PRINT
   T$:KB =  PEEK (49152): IF KB <
   128 THEN 20
```

poke the time and date directly to the screen. Try changing 9,8 to 50,6. Doing so sends the output to $0632 on the screen page instead of $0809 in the Applesoft program. You can also change the format with open-apple/Control/Esc as you're running the program.

David R. Hill
Cape Elizabeth, ME

NOT SO NEW

Here's a way to retrieve an Applesoft program, even if someone has typed the NEW command. First, type in a program such as

```
10 REM UN-NEW TEST
```

Then type

```
?PEEK(2049)
?PEEK(2050)
```

Type NEW and, to make sure the program is gone from memory, type LIST.

To return your program to memory, type

```
POKE 2049,X
POKE 2050,Y
```

where X and Y are the values you received from the PEEKs you did earlier. Your program should now be back in memory!

Adam Farkas
Port Washington, NY

EPSON AND APPLEWORKS

In the May 1987 issue of *A+*, a reader named Tom Russo asked how he could get his Epson FX-85 printer to interact with AppleWorks to enable him to use the SelecType feature of his printer. I had a similar problem with my Epson LX-80 printer.

I was able to solve the problem by going to the Print Options menu (open-apple/O) and entering the Pause Here command (PH) where I wanted to change the printer's typestyle. This method works because the printer is already on-line and is pausing, waiting for you to enter your commands and then press the space bar to continue printing.

I use this technique at the beginning of word-processing documents that I want printed in near-letter-quality (NLQ) print. Since the pause is at the beginning of my document, when I activate the printer (open-apple/P), the printer never begins the actual printing until I press the space bar.

This technique can be used anywhere in your document and gives you a way to use AppleWorks and enjoy the SelecType features of your Epson printer.

Paul H. Riker
Sodus, NY

Please send your Apple II tips to A+, 11 Davis Drive, Belmont, CA 94002; ATTN: Tips and Techniques. We will pay $25 for each tip we publish, so be sure to include your name, address, and social security number.

P I P E

The Print-it! interface from Texprint, Inc. lets users produce snapshot printouts of programs.

PRINT-IT!

Compatible with both serial- and parallel-interface printers, the Print-it! interface card lets users obtain snapshot printouts at any time within a program. At the touch of a button, the card causes the program to pause, print the screen display, and then automatically resume operation where it left off. Users can also pause and resume while using a program without printing. Print-it! can print text, drawings, logos, program instructions, and double-low/hires graphics. With its selection of built-in, one-letter printer commands, users can create such enhancements as graphics rotation and printing two screen pages side by side. Intended for educational uses, the card works with most popular software and comes with a push-button, serial- or parallel-interface printer cable, and manual.

VITAL STATISTICS
List Price: $199
Requires: Apple IIe, printer
Texprint, Inc.
200 Reservoir Street
Needham Heights, MA 02194
(800) 255-1510
(617) 449-5808

CIRCLE READER SERVICE NO. **501**

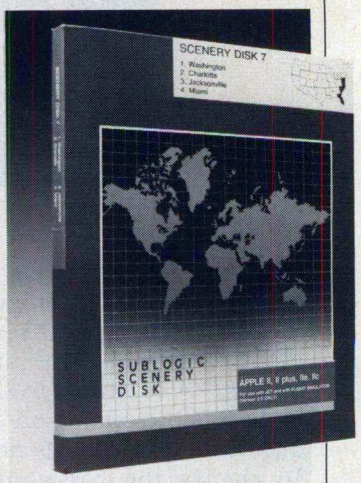
NETWORX HEAD & SCREEN MAINTENANCE KIT

Networx Head & Screen Maintenance Kit, the latest addition to the company's line of computer and electronics accessories, provides a complete cleaning system for CRT terminal screens and microcomputer heads (5¼-inch diskettes). The kit contains a nonaerosol bottle of Networx Head Cleaning Fluid, which users apply to the cleaning diskette; two Head Cleaning Diskettes, which work with single- or dual-sided drives; ten wet CRT Screen Clean Pads that are premoistened with antistatic solution; and ten dry CRT Screen Clean Pads.

VITAL STATISTICS
List Price: $29.95
Networx
203 Harrison Place
Brooklyn, NY 11237-1587
(718) 821-7555

CIRCLE READER SERVICE NO. **502**

A complete cleaning system for CRT terminals and floppy-disk-drive heads is available from Networx.



Scenery Disk #7 provides East Coast scenery to users of Flight Simulator II and Jet.

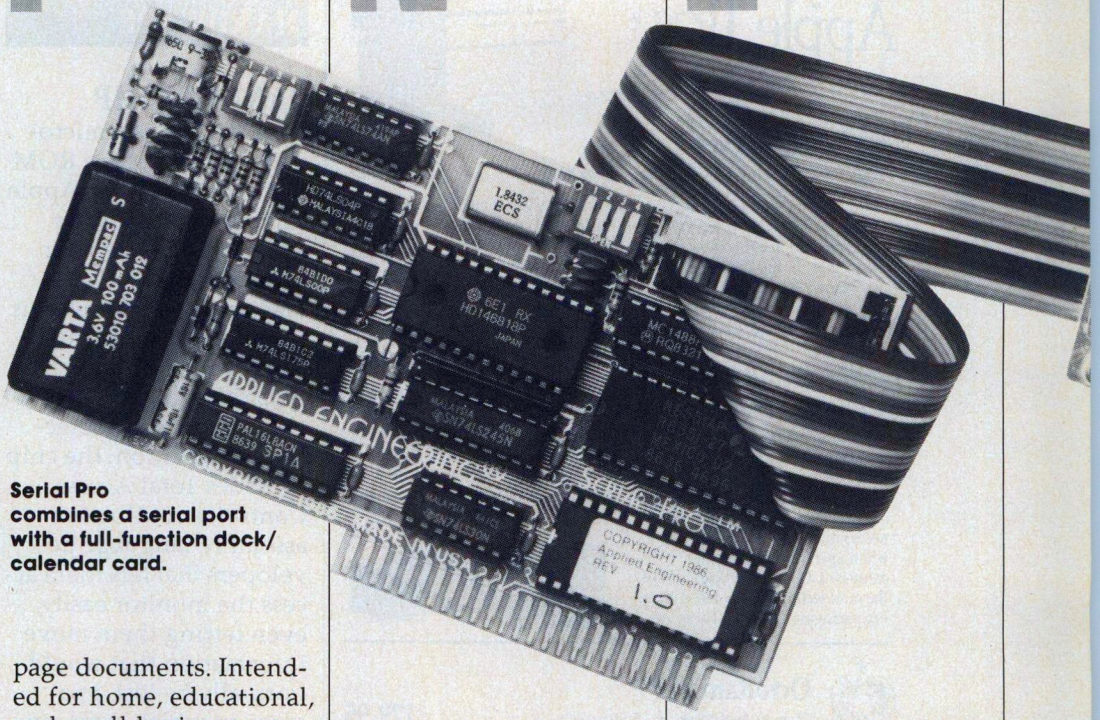
SCENERY DISK #7

For use with Flight Simulator II and Jet, Scenery Disk #7 covers the East Coast of the U.S., from Washington, D.C., through Key West, Florida. The disk features hundreds of miles of coastline, rivers, roads, railroads, racetracks, transmitter towers, elevated bridges, and more than 130 airports. The scenery includes highly detailed sight-seeing areas, including major buildings in cities, and generic areas with radio navigation aids and refueling facilities. The airports include a dozen military, 22 with refueling facilities, 7 that support ATIS, some with flashing beacons, and 10 with ILS approaches.

VITAL STATISTICS
List Price: $19.95
Requires: Apple II Plus,

LINE

IIe, or IIc; 5¼-inch disk drive; Simulator II or Jet. Copy-protected; does not work with mouse.
SubLogic Corporation
713 Edgebrook Drive
Champaign, IL 61820
(800) 637-4983
In IL, AK, HI (217) 359-8482
CIRCLE READER SERVICE NO. **503**



Serial Pro combines a serial port with a full-function dock/calendar card.

PROWRITER JR. PLUS

An enhanced version of the ProWriter Jr. dot-matrix printer, the ProWriter Jr. Plus offers 160 cps in draft mode—a 33% increase in speed—and 30 cps in near-letter-quality mode. In addition, its throughput speed has been increased from 48 to 61 lines per minute, and its buffer memory has been increased threefold to 8K to handle multiple-page documents. Intended for home, educational, and small-business use, the printer is lightweight and has a space-saving, built-in printer stand that allows users to place paper beneath the printer. The printer can handle single sheets, variable-size forms, envelopes, and continuous paper and accepts paper through the front.

VITAL STATISTICS
List Price: $369
Requires: Apple IIe
C. Itoh Digital Products, Inc.
19750 S. Vermont Avenue
Suite 220
Torrance, CA 90502
(800) 423-0300
(213) 327-2110
CIRCLE READER SERVICE NO. **504**

The ProWriter Jr. Plus features more speed and memory than does the ProWriter Jr.

SERIAL PRO CARD

A powerful multifunction card that combines a serial port with a full-function clock/calendar card, Applied Engineering's Serial Pro can connect to most printers, modems, or other serial-interface devices. The card's clock/calendar is compatible with ProDOS, DOS, and AppleWorks and automatically time- and date-stamps AppleWorks files. Because it uses a built-in setup screen, not DIP switches or disks, setup is easy. Serial Pro comes with a manual, cable, and detailed instructions for connection to popular printers and modems.

VITAL STATISTICS
List Price: $159
Requires: Apple II Plus, IIe, or IIGS. ProDOS or DOS.
Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

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Introducing the Conserver – an integrated unit giving you everything you need in one compact unit (see picture above). Conserver has six switched AC outlets, surge protection, and a super quiet fan (no need to worry about those "electrically noisy" internal fans). It cleverly holds one or two Apple 3.5 Drives (special diskette holder included for owners with one 3.5 drive), and also acts as a monitor stand.

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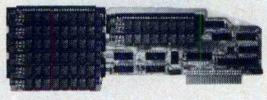
OctoRam 2 meg.



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Tired of waiting and waiting while the IIGS is booting up your application or desktop? Supercharge your IIGS with the new OctoRam ESP expansion board. OctoRam ESP (Extended Static-ram Pack) stores up to 512K of programs for instant access. Store AppleWorks™, Visualizer IIGS™, the IIGS desktop, ProDOS™, or virtually anything you want for immediate access. The IIGS sees OctoRam ESP as a ROM disk, therefore you can use it as the startup disk. Your programs are always in RAM, backed up by a rechargeable battery. Better than ROM packs (reads *and writes*), faster than EEPROM (100s X when writing). OctoRam ESP 128K – $179.95 (requires OctoRam).

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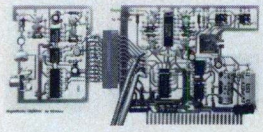
IIGS Stereo Card **$59.95**

Digitizer with SuperSonic



Get a SuperSonic stereo card and turn your IIGS into a hi-fidelity stereo powerhouse. Plug in your Bose RoomMates®, stereophonic headphones, home stereo or "boom box", and even low power non-amplified speakers and your IIGS will surround you with stereo sound. The SuperSonic is capable of near compact disk clarity. Connects directly to the Ensoniq® sound chip and provides stereo with popular stereo software from Accolade, Activision®, Broderbund, Electronic Arts®, Great Wave Software . . .

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PIPELINE

HARDWARE

BANANA CHIP

Banana Chip is a microchip that replaces a ROM chip installed in an Apple computer and lets the computer display your own personalized message when you turn it on. To prevent others from using your computer, the chip can optionally include password protection. In addition, the chip provides Total Access Control, a routine for assembly-language developers that lets them access the monitor easily, even letting them move information that would normally be lost, to a place in which they can view it. To order Banana Chip, you specify your message, an optional password, and the model and version of your computer.

VITAL STATISTICS

List Price: $39.95

Requires: Apple II Plus, IIe, IIc, or IIGS

Azure Mountain Products
14755 Ventura Blvd.
Suite 1483
Sherman Oaks, CA 91403
(800) 843-0975
In CA (800) 443-9060
(818) 906-TECH

CIRCLE READER SERVICE NO. **505**

HARD/SOFTWARE

TALKING MATH TUTOR

Designed for children ages 6–13, Talking Math Tutor is an easy-to-use mathematics package that combines verbal and visual tutorial techniques. The basic package comprises a disk containing exercises covering addition, subtraction, multiplication, and division; a hardware voice card; and an exterior speaker. The card's TTL speech chip is able to synthesize speech and complex sounds, providing an easy-to-understand "voice." When students make a mistake, the computer tells them and shows them how to begin to solve the problem without telling them the answer.

Nine additional disks are available to expand and supplement the system. Programs cover such topics as negative numbers, times tables, percentages, fractions, and probability. Also available are homework-assistance programs and a speech program that lets users make their own programs talk.

VITAL STATISTICS

List Price: basic package, $79.99; additional disks, $19.95–$34.95 each

Requires: Apple II Plus or IIe

Intrinsic Systems
P.O. Box 103
Bronx, NY 10470
(212) 324-6110

CIRCLE READER SERVICE NO. **506**

HEARSAY 1000, SOFTWARE

Hearsay has introduced Hearsay 1000, a low-cost voice synthesizer and recognizer, and two lines of software for use with the device. Hearsay 1000 lets your computer talk, listen, respond, and obey when you give a verbal command. The product includes special built-in software that enables it to work with most popular menu-driven software. The card is easy to use

PIPELINE

and install and comes with a microphone and a speaker.

The new software comprises three titles in the Software for Children series, which is designed to teach young children basic skills, and a fourth title for older children and adults. The programs for young children are Rhyme & Reason, which uses familiar nursery rhymes to teach names of animals, parts of the body, telling time, days of the week, and more; Aqua's Circus, which uses circus characters to teach shapes, colors, letters, numbers, and simple math and prereading skills; and Think Bank, a concentration-type game in which children match concepts with pictures, match tunes, and unscramble word jumbles. Each package challenges auditory and visual senses and offers several levels of difficulty.

The fourth title, Hearsay Intelligent Talking Terminal (HTT), is a voice-activated/response telecommunications package. On receiving a verbal command, HTT can automatically dial a telephone number and let you read and hear responses, such as information from dial-up services.

VITAL STATISTICS
List Price: Hearsay 1000, $149.95; Software for Children, $39.95 each program; HTT, $49.95
Requires: Apple II Plus or IIe
Hearsay, Inc.
1825 74th Street
Brooklyn, NY 11204
(718) 232-7266
CIRCLE READER SERVICE NO. **507**

CONJECTURE

Intended for both home and educational use, the game Conjecture provides 1600 puzzles for solution by up to five players or teams. In addition, individuals can play against the clock to solve ten Challenge Rounds. Players can choose from color hi-res or monochrome double-hi-res modes and can modify up to eight of the game's features. A menu-driven editing program lets users edit the supplied puzzles, add puzzles to or delete them from the general puzzle file, and create their own password-protected puzzle files and disks. The game can be used for improving spelling, vocabulary, typing, and reasoning skills.

VITAL STATISTICS
List Price: $35.95
Requires: Apple IIe with extended 80-column card, or Apple IIc; 5¼-inch disk drive. DOS 3.3; copy-protected; does not work with mouse.
Robert Scott Enterprises
P.O. Box 1408
Auburn, WA 98071
(206) 939-4105
CIRCLE READER SERVICE NO. **508**

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- The entire system is on one standard size plug in card that fits neatly inside the Apple.
- System includes sample programs on disk.

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A few applications may include the monitoring of ● flow ● temperature ● humidity ● wind speed ● wind direction ● light intensity ● pressure ● RPM ● soil moisture and many more.

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A/D & D/A Features:
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- 8 channels D/A
- Superfast conversion time
- Very easy programming
- Many analog ranges
- Manual contains sample applications

A/D SPECIFICATIONS
- 0.3% accuracy
- On-board memory
- Fast conversion (.078 MS per channel)
- A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, −5 to +5, −2.5 to +2.5, −5 to 0, −10 to 0.

The A/D process takes place on a continuous, channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A SPECIFICATIONS
- 0.3% accuracy
- On-board memory
- On-board output buffer amps can drive 5 MA
- D/A process is totally transparent to the Apple (just poke the data)
- Fast conversion (.003 MS per channel)
- User programmable output ranges are 0 to 5 volts and 0 to 10 volts

The D/A section contains 8 digital to analog converters, with output buffer amplifiers and all interface logic on a single card. On-card latches are provided for each of the eight D/A converters. No D/A converter could be easier to use. The on-board amplifiers are laser-trimmed during manufacture, thereby eliminating any requirement for off-set nulling.

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SIGNAL CONDITIONER

Our 8 channel signal conditioner is designed for use with both our A/D converters. This board incorporates 8 F.E.T. op-amps, which allow almost any gain or offset. For example, an input signal that varies from 2.00 to 2.15 volts or a signal that varies from 0 to 50 mV can easily be converted to 0-10V output for the A/D.

The signal conditioner's outputs are on a high quality 16 pin gold I.C. socket that matches the one on the A/D's so a simple ribbon cable connects the two. The signal conditioner can be powered by your Apple or from an external supply.

FEATURES
- 4.5" square for standard card cage and 4 mounting holes for standard mounting. The signal conditioner does not plug into the Apple, it can be located up to ½ mile away from the A/D.
- 22 pin .156 spacing edge card input connector (extra connectors are easily available i.e. Radio Shack).
- Large bread board area.
- Full detailed schematic included.

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I/O 32

- Provides 4, 8-Bit programmable I/O Ports
- Any of the 4 ports can be programmed as an input or an output port
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- Your inputs can be anything from high speed logic to simple switches
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- The I/O 32 is your best choice for any control application

The I/O manual includes many programs for inputs and outputs.

Some applications include:
Burglar alarm, direction sensing, use with relays to turn on lights, sound buzzers, start motors, control tape recorders and printers, use with digital joystick.

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Please see our other full page ad in this magazine for information on Applied Engineering's Timemaster Clock Card and other products for the Apple.
Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products compatible with Apple II and //e.
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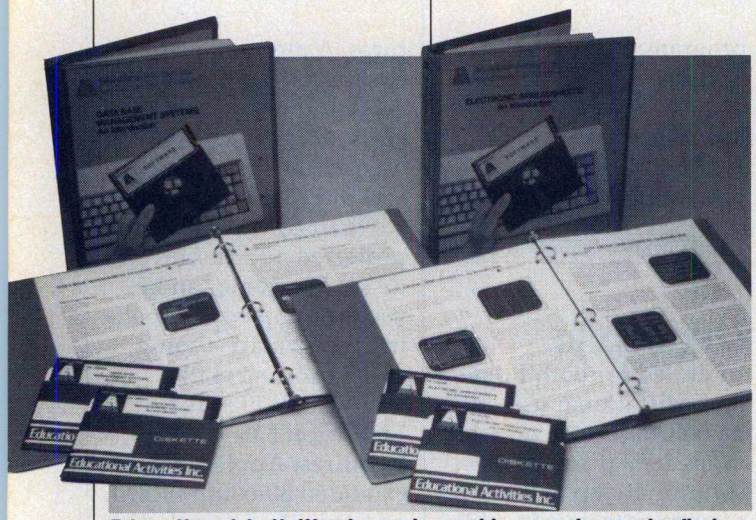

Educational Activities has released two packages for first-time users of electronic databases and spreadsheets.

EDUCATIONAL ACTIVITIES SOFTWARE

For first-time users of electronic databases and spreadsheets, Data Base Management Systems: An Introduction and Electronic Spreadsheets: An Introduction are available from Educational Activities. Both programs present information common to most popular systems and contain a working prototype.

Data Base Management Systems introduces databases by describing their basic elements—files, records, and fields—and their contents—numeric and character data. It then shows how to create databases and enter and display data. Finally, it covers more advanced concepts, such as sorting, indexing, and report generation.

Electronic Spreadsheets covers basic spreadsheet elements, such as rows, columns, cells, labels, values, and formulas. It then describes how to move around in a spreadsheet using the status and command/help areas and the entry line. Finally, it discusses functions and global and format commands; presents examples; and helps users create, edit, and print their own spreadsheet.

VITAL STATISTICS

List Price: $69.95 each

Requires: Apple II Plus, IIe, or IIc; 48K RAM; 5¼-inch disk drive. DOS 3.3; copy-protected (comes with backup package); does not work with mouse.

Educational Activities
P.O. Box 392
Freeport, NY 11520
Written inquiries only

CIRCLE READER SERVICE NO. **509**

APPLEWORKS COMPANION

AppleWorks Companion gives the visually impaired full access to AppleWorks' word-processing, database, and spreadsheet modules by providing oral keyboard feedback and full screen-review. The program adds commands to AppleWorks that let users hear what is on the screen and enable them to have any file read to them. The Slotbuster II card with the speech-synthesizer option generates speech.

VITAL STATISTICS

List Price: AppleWorks Companion, $39; Slotbuster II with speech option, $190

Requires: Apple IIe or IIGS, 128K RAM, AppleWorks 2.0, Slotbuster II with speech option

RC Systems, Inc.
121 West Winesap Road
Bothell, WA 98012
(206) 672-6909

CIRCLE READER SERVICE NO. **510**

ZIMCO
INTERNATIONAL, INC.
85-39 213 St., Queens Village, NY 11427

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Applied Engineering RGB Option	$99
Applied Engineering Timemaster/Viewmaster	$95/109
Applied Engineering ZRam ULTRA 1/2/3	$CALL
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Graphics Printer Card	$55
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Joystick for Apple IIe/IBM	$19
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C.ITOH Prowriter Jr.	$245
EPSON FX-86E	$395
Epson FX-286E	$545
Epson EX-800	$465
NEC Pinwriter P6*	$460
OKIMATE 292/293	$462/611
OKIDATA 192+/193+	$340/554
PANASONIC KXP-1092	$329
Panasonic KXP-1592	$419
QUME LetterPro20+/Sprint1400*	$592/899
STAR NX-10 Parallel	$236

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TOMPSON RGB 540x240 resolution	$240

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HAYES Smart Modem 300 (IIc)	$152
Hayes 1200/2400	$373/585
Hayes Micromodem IIe	$145
1200 bps Hayes Compatible Ext.	$119
2400 bps Hayes Compatible Ext.	$299
PROMETHEUS PRO-MODEM	$269
Prometheus 1200A	$197
Prometheus 2400	$396
US ROBOTICS Courier 2400	$397

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In addition to the Grand Prize Winners, 25 FIRST PRIZE Winners in each division will be awarded a choice of software from: Activision, Addison-Wesley Publishing Company, Blue Lion Software, Broderbund, Compu-Teach, Davidson & Associates, Designware, Electronic Arts, First Byte, Krell Software, K-12 MicroMedia, Learning Company, Mindscape, Monogram Software, Spinnaker, Springboard, Sunburst Communications, The Cerebic Institute, Weekly Reader Family Software, and Woodbury Software.

Simply tell us about innovative, creative, and successful methods you have used to teach with computers. Entries must be 500 words or less, typewritten and double-spaced. Please include the category, **Classroom Users** *(one person teaching a group of people)* or **Home/Personal Users** *(one person teaching one other person)*. Make sure your entry has your name, address and telephone number.

SEE ADDITIONAL RULES AND REQUIREMENTS ON PAGE 118.

Send your entries to:

Classroom Users:
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"HOW I USE A II TO TEACH"
11 DAVIS DRIVE
BELMONT, CA 94002

Home/Personal Users:
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BELMONT, CA 94002

PHOTO COURTESY APPLE COMPUTER, INC.

ALL ENTRIES MUST BE POSTMARKED BY **AUGUST 15, 1987**, AND RECEIVED BY **AUGUST 21, 1987**.

Enter The A+ First Annual

"HOW I USE THE II TO TEACH" CONTEST

CONTEST RULES

See page 117 for further details No Purchase Necessary

1. All entries must be 500 words or less, typed and double-spaced. Multiple entries, mailed in separate envelopes, will be accepted. Include your name, address and daytime/evening telephone number on each entry. Entries become the sole property of *A+* magazine. Mail completed entries to the category you are entering:

Classroom Users:
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"HOW I USE A II TO TEACH"
11 DAVIS DRIVE
BELMONT, CA 94002

Home/Personal Users:
A+ HOME TECHNIQUES
"HOW I USE A II TO TEACH"
11 DAVIS DRIVE
BELMONT, CA 94002

Entries that do not fulfill the above requirements will be disqualified.

2. Contest begins May 15, 1987, and is promoted and advertised in *A+* magazine and related publications. All entries must be postmarked by August 15, 1987, and received no later than August 21, 1987. All decisions will be made by September 15, 1987, and winners will be announced beginning with the November 1987 issue of *A+* magazine.

3. There will be a total of 52 prizes awarded as follows:

A. One Grand Prize for the Classroom User category and one Grand Prize for the Home/Personal User category. Grand Prize is an Apple IIGS system complete with an Apple IIGS courtesy Apple Computer, Inc., AST-VisionPlus Digitizer, Applied Engineering 512K GS Memory Board, MDIdeas SuperSonic Stereo Card, Telex MagnaByte Image Projection System, a KroyKolor printer/photocopier enhancer, and Bose RoomMate speakers. Approximate retail value is $5820 per system.

B. Twenty-five First Prizes for Classroom User category and 25 First Prizes for Home/Personal User category. First Prize is a choice of educational software selected by the editors of *A+* magazine. Approximate retail value of $39 to $100 each. No substitutions for prizes. Prizes are not transferable. Taxes are the responsibility of the winners. All manufacturer's claims or warranties will apply. *A+* magazine makes no claims or warranties for any prizes. Winners may be required to execute an affidavit of eligibility and release. *A+* magazine has the right to reproduce the name, address and likeness of winners in future promotions. *A+* magazine shall have all publication rights in all entries.

4. Winners will be selected by a panel of judges, selected by the publishers, from all submissions that meet entry requirements. Decisions will be based equally upon content, originality, practicality, and results of educational applications described. Decisions of the judges will be final.

5. The *A+* "How I Use The II To Teach" Contest is open to all individuals of at least 18 years of age who are residents of the U.S., its territories and possessions, with the exception of employees (and their families) of Ziff-Davis Publishing Company and its properties, and their advertising and promotion agencies. Void wherever restricted or prohibited by law.

6. For winners list, send a stamped, self-addressed envelope to: *A+* magazine, "How I Use The II To Teach" Contest, 11 Davis Drive, Belmont, CA 94002. Refer to the November and December 1987, and the January 1988, issues of *A+* magazine for winners' names and reprints of winning entries.

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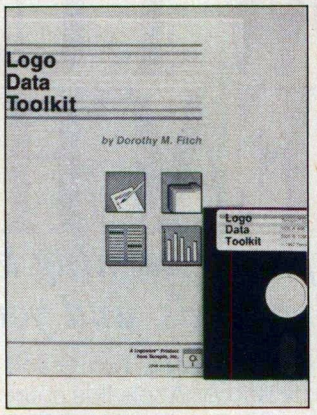

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VITAL STATISTICS
List Price: $49.95
Requires: Apple II Plus, IIe, IIc, or IIGS; 64K RAM; 5¼-inch disk drive; Terrapin Logo, Version 2.0 or later. DOS 3.3; not copy-protected; does not work with mouse.

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Texet Multi-Systems has released two multiuser packages—Dungeons of Lore and Applparlour.

Dungeons of Lore is a dungeons-and-dragons-type game that two users can play at the same time via modem. Although the host machine must be an Apple, the other player can use any type of machine with terminal software and a modem. In the game, players explore the world, battle monsters or each other, cast spells, find and use magical items, complete quests, and more. They can also act as dungeon master and create their own worlds and characters.

Applparlour is a teleconferencing package designed for up to seven simultaneous conversations via modem. Users can send messages to everyone or to individuals, and special commands allow the sysop to validate callers, hang up, and more.

VITAL STATISTICS
List Price: Dungeons of Lore, $69; Applparlour, $55
Requires: Apple II Plus, IIc (Dungeons of Lore only), or IIe; 64K RAM; modem. Pascal; copy-protected (hard-disk installation possible).
Texet Multi-Systems
4401 Speedway
Suite 308
Austin, TX 78751
(512) 371-7983
CIRCLE READER SERVICE NO. **512**

Rescue Squad

BY GARY B. LITTLE

PRINTER REFERENCE

Q. *Do you know of any reference book that has a listing of the commands that work with various printers and printer-interface cards? I need this information so that the graphs and charts created by physics programs I develop for the local high school can print out properly with the many printer configurations the students use.*

Phil Southworth
Florence, WI

A. There is a series of just such books, *The Programmers' Handbook of Computer Printer Commands* (Volumes I, II, and III), and it's available from Cardinal Point Inc., P.O. Box 596, Ellettsville, IN 47429 ([812] 876-7811). Even with the book, however, you are going to have a hard time testing the seemingly infinite number of configurations you might encounter. A convenient alternative is to insist that the school invest in The Printographer (Roger Wagner Publishing, 10761 Woodside Avenue, Suite E, Santee, CA 92071; [619] 562-3670). This nifty little program works with hundreds of printer configurations, and you can use it to print graphic and text images in a variety of convenient formats.

APPLESOFT AS TEXT FILE

Q. *Is it possible for me to save an Applesoft BASIC program to disk as an ASCII text file so I can load it into my word-processing program?*

Anthony J. Oresteen
Batavia, IL

A. Unlike some dialects of BASIC for other computers, neither Applesoft nor its BASIC.SYSTEM ProDOS interface has a command for saving a program to disk as lines of readable text. When you use the Save command, the program is stored in a compressed, tokenized form in a BAS file, a form that only the Applesoft interpreter understands. To convert the program to text form, you must first create a text file called BAS.TO.TXT that contains the following three lines:

```
?"Transferring program to 'BASIC.TXT'"

0 D$=CHR$(4) : ?D$;"OPENBASIC.TXT" :
  ?D$;"CLOSE" : ?D$;"DELETEBASIC.TXT" :
  ?D$;"OPENBASIC.TXT" :
  ?D$;"WRITEBASIC.TXT": ?"NEW":LIST1,63999
  : ?D$;"CLOSE" : END

RUN
```

You can use a word-processing program to create this file, but be sure to save it to disk as a text file. To convert your Applesoft program to text, load it into memory and then enter the command BAS.TO.TXT.

BAS.TO.TXT works by first adding a line #0 to the program and then running the program. Line #0 gets control first, opens a text file called BASIC.TXT, lists the program into the file, and then closes the file. You can then deal with the text file as you would with any other. BAS.TO.TXT works with any Applesoft program that does not contain a line #0, illegal line numbers, or embedded (and hidden) assembly-language routines.

MANUAL SEARCH

Q. *I'm trying to learn how to program in BASIC and have been referred to a book called* BASIC Programming with ProDOS. *Where can I find this book?*

Robert J. Molessa
Fort Wayne, IN

A. *BASIC Programming with ProDOS* is an official Apple reference manual and is now published and distributed by Addison-Wesley Publishing Company, Inc., 6 Jacob Way, Reading, MA. You should be able to order it through any bookstore, since Addison-Wesley is one of the largest publishers of textbooks in the world. Addison-Wesley now handles almost all of Apple's manuals, including those related to the Macintosh and the Apple IIGS. ✚

Please send your questions and problems to Rescue Squad, A+, 11 Davis Drive, Belmont, CA 94002. Because of limited space, we aren't able to publish responses to all inquiries we receive.

ILLUSTRATION BY TOM MURRAY

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··IF want_free_newsletter THEN BEGIN
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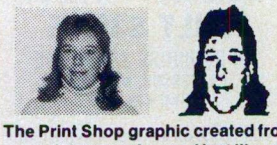

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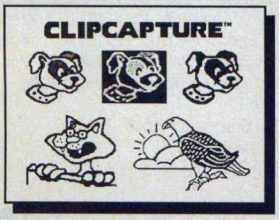

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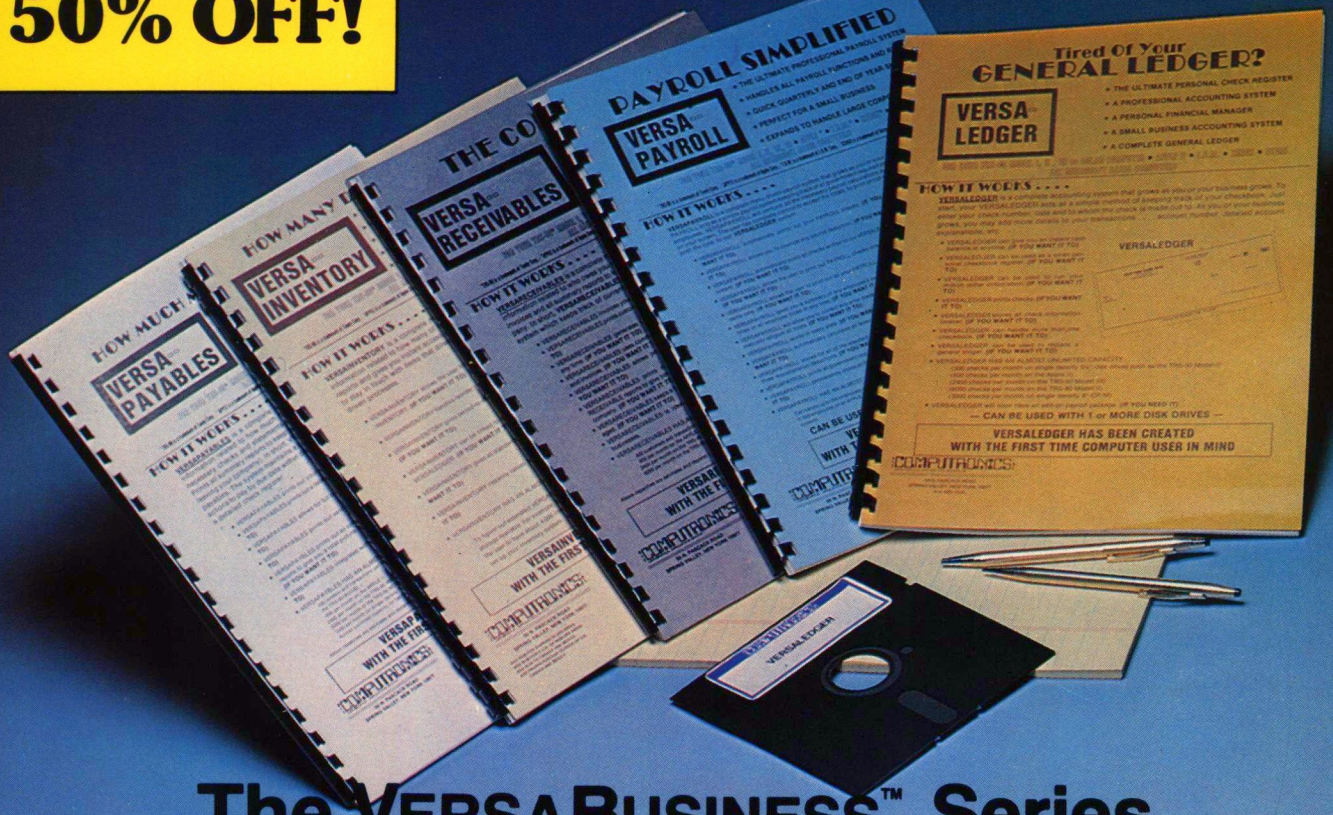

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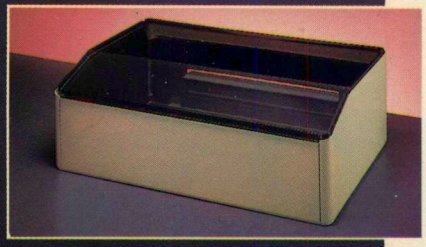

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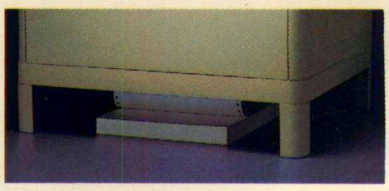

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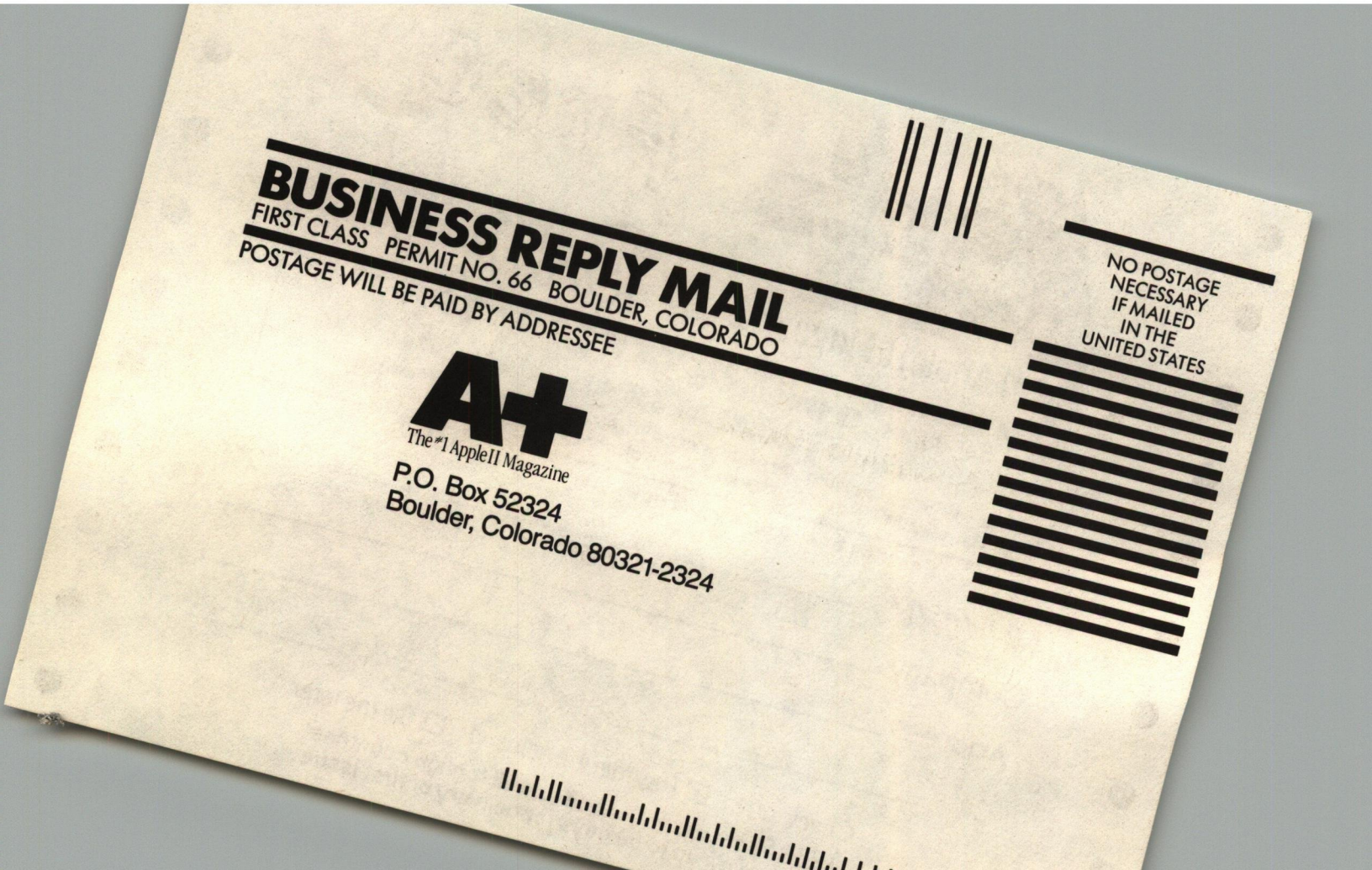
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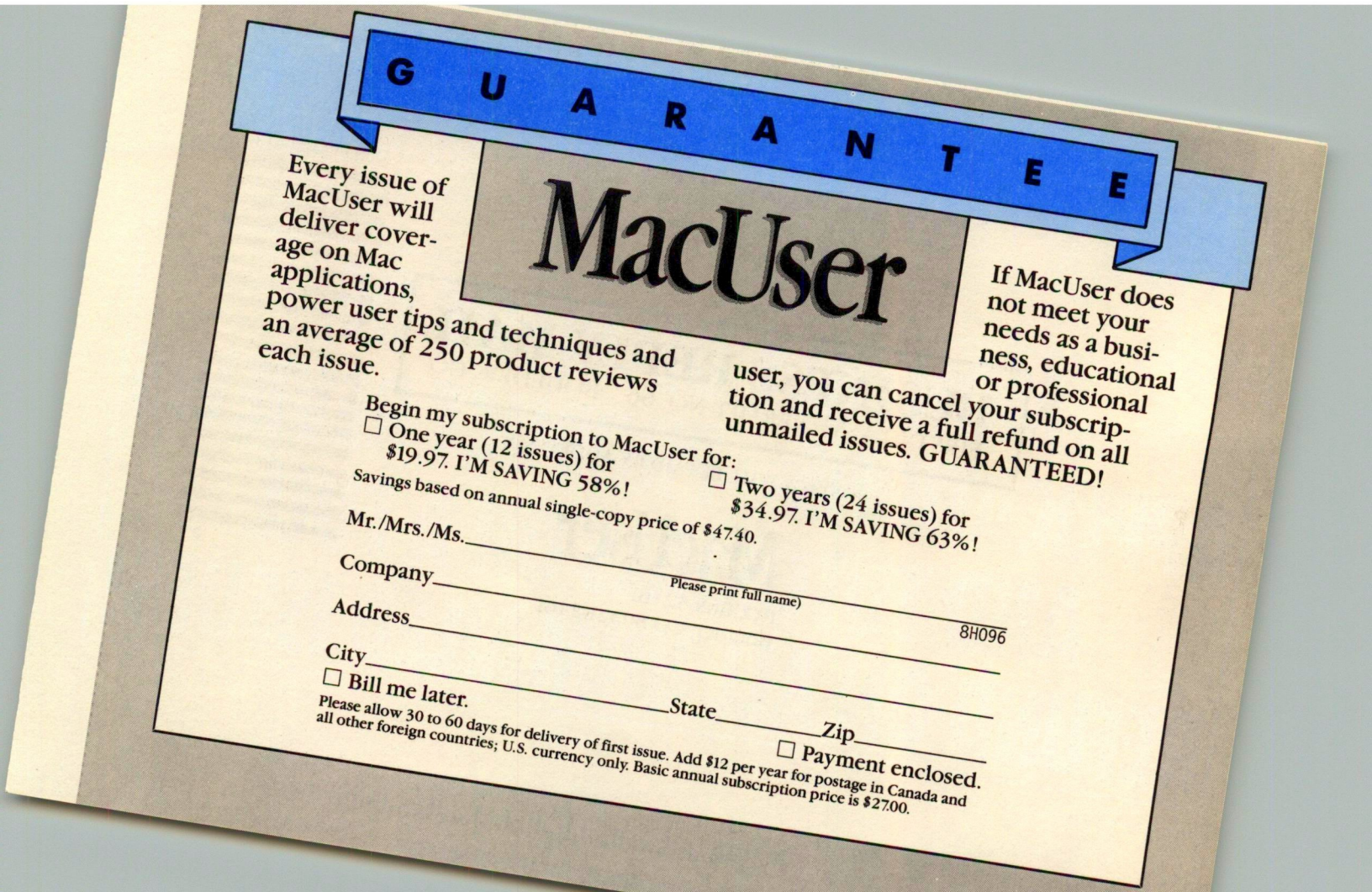
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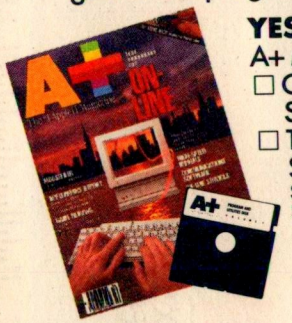

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